ARMY RESEARCH AND DEVELOPMENT

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Army Presents New Materials Program to MAB

Theme of the Month

By Major General R. T. Nelson
Chief Signal Officer, Department of the Army

In their periodic attempts to delineate those scientific areas of "legitimate" interest to the military, research and development administrators would do well to look at the history of communications during the past 100 years.

Who could have foreseen the sequence of events set in motion by the development and adoption in 1860 of the relatively simple Myer flag and code system for improved battlefield communications? Until then, and even for a considerable time afterward, the relationship between communications capability and combat capability was little understood.

This relationship was graphically illustrated when the first use of signals to direct gunfire allowed, for the first time, employment of forward observers. This occurred on June 15, 1861 near Fort Monroe, Va. By means of signal flags, a detail of forward observers in a tugboat directed the artillery fire of the battery at Fort Wool in Hampton Roads, Va., against the Confederate works at Sewall's Point with dramatically effective results. The age-old artillery goal of "first shot on target" immediately loomed as an attainable objective.

Once the advantages of the new flag and code system in terms of improved command control became apparent, the potentialities of communications as a weapon began to receive serious consideration. Thereafter followed a chain of Army development endeavors that reached into practically every facet of scientific research.

The results of these endeavors have been so numerous and of such variety as to seem at first glance almost unrelated. The flag and code system led to Army exploitation of the telegraph, through the tele-

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Objectives of a programmed substantial expansion of research and development activities in the field of materials were outlined in June to the Materials Advisory Board (MAB), National Academy of Sciences-National Research Council.

Geared to many urgent requirements of the Army, the materials program is expected to cost about $20 million annually. It is the result of many months of staff level planning, joint meetings with other Government agencies, and broadly coordinated effort among the Technical Services.

In presenting the program to the Materials Advisory Board, Lt Gen Arthur G. Trudeau, Chief of Research and Development, said he expects "each Technical Service to recognize a fundamental relationship between materials research and development objectives and military operational requirements."

Scheduled for early publication is an R&D Directive that will prescribe procedures to be followed in aligning closely the Army *Basic* Materials Program in support of an overall *Applied* Materials Research Program.

Under the directive, each Technical Service will be assigned one materials budget project *closely aligned to its mission.* The technical plan for the basic project and the budget line item

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40 Nominated for R&D Achievement Awards

Forty nominations for Army Research and Development Achievement Awards made by Chiefs of the Technical Services, U.S. Continental Army Command and other Army R&D agencies have been submitted for review by an awards committee.

Headed by Maj Gen William J. Ely, Director of Army Research, the committee includes Dr. Harold C. Weber, Chief Scientific Advisor, Office of the Chief of Research and Development, Dr. Richard A. Weiss, Deputy and Scientific Director of Army Research, and Dr. Paul A. Siple, Scientific Advisor, Army Research Office.

Indications are that the presentation will be scheduled in July. Lt Gen Arthur G. Trudeau, Chief of Research and Development, upon whose direction the R&D Achievement Awards were established under the general provisions of AR 672–301, is expected to make the presentations.

As set forth in AR 672–304, Dec. 20, 1960, the basis for the awards will be "recognition of technical achievements of scientists and engineers by accepted leaders in their field." Any scientist or engineer employee of the Department of the Army is eligible. Group awards may include technicians or subprofessional personnel.

Separate command and installation awards may be made by "commanders" with a substantial

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Army R&D Newsmagazine

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Objectives of this publication are: To improve informal communication among all segments of the Army scientific community and other Government R&D agencies; to further understanding of Army R&D progress, problem areas and program planning; to stimulate more closely integrated and coordinated effort among the widely dispersed and diffused Army R&D activities; to maintain a closer link from top management through all levels to scientists, engineers and technicians at the bench level; to express views of leaders, as pertinent to their responsibilities, and to keep personnel informed on matters germane to their welfare and pride of service.

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Theme of the Month

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graph to responsibility for providing the Nation's first weather service, and through weather forecasting to studies in the all-embracing field of meteorology.

Knowledge of meteorology and the mission of combat surveillance led to expansion into the field of aviation, development of the military airplane, the birth of the Air Force, and such related fields as aeronautics and dynamics.

In the meantime, the strictly communications mission of the Army embraced the development of the telephone, radio and radar. With radar eventually came man's first contact with the moon and the dawn of the Space Age, in which we have seen development of weather and communications satellites.

In all of these developments there has been a curious progression from the simple to the complex—a progression so marked and a result so complex as to bear little resemblance to the nature of its origins. From Maj Myer's simple system for passing signals from one hilltop to another, it is a giant step to voice and teletypewriter signals by radio relay from outer space.

Things that have been learned in the process have given our modern Army new capabilities in combat surveillance, target acquisition, and command control such as would never have been possible without this logical followup of potentialities so modestly offered by improved battlefield communications.

In fact, the meaning of "communications" has evolved from the narrow concept of simply "transmission of word-messages" to a definition that includes the acquisition, transmission, and correlation of intelligence of all kinds and employing, in addition to voice and code transmission techniques, a wide variety of sensors, such as photography, radar, and infrared.

Communication today, and provision of the military means thereof, embraces equipments and techniques which require investigation of all potential power sources, of the properties of materials, the development of new materials, and exploration of the entire spectrum of science.

Far greater in significance than Maj Myer's initial contribution to improved battlefield communications was the fact that his efforts focused attention upon the relationship between improved communications and improvement in combat capability—a relationship that has had a profound effect upon the development of military strategy and tactics in our time.

In the evolution of modern warfare essential ingredients to success have developed to form a trilogy, axiomatic and indispensable—greater firepower, greater mobility, and more effective command control. For centuries, military men, understandably, gave their first attention to greater and greater firepower, and only in recent decades to mobility and command control.

In this era of powerful new weapons of tremendously increased ranges, informed command control assumes greater importance than ever before. Dispersal and rapid movement of military forces over a large area is the key to survival and to victory on the modern battlefield. Without the advances that have taken place in the art of communications, effective command control of forces on the move and so widely dispersed would not be possible.

Communications today is 99 percent electronics. A curious footnote about electronics is the "self-feeding" nature of the business. Through electronics we learn how to solve many military problems and provide our Armed Forces with new combat capabilities. These new solutions create new problems. The trend is ever upward and where it will lead us, none can foretell.

Some things we do know. Communications, and the all-embracing field of electronics, have become such an indispensable part of military operations as to assume the status of weaponry, both for offense and defense. This is not to say that a radio set, for example, is a weapon with which to kill or be killed, but it is the kind of a weapon without which you might be killed and could not otherwise operate effectively. As such a weapon, communications has become of transcendant importance in all military endeavors.

In examining the history of military communications, there is this inescapable conclusion. With the increased range of modern weapons and the consequent increased cost, the requirement for "first shot on target" is still with us, just as it was in 1861. Greater dispersal of units requires even more and better communications for adequate control by commanders. Modern capabilities in fire and movement are vitally dependent upon, and are inseparable from, a communications capability.

Considering the ever-expanding nature of communications, and the history of its development, there is another inescapable conclusion. For those of us charged with a research and development mission, we must ever keep an open and inquiring mind, and apply imagination to everything we do. Rarely can it be said with certainty that some incidental and seemingly innocuous discovery in the laboratory or elsewhere does not have a military application.

Army Presents New Materials Program to MAB

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—"Basic Research in the Materials Sciences"—is to be the responsibility of Army Research Office-Durham, in line with its recently expanded function.

For example, the Ordnance Corps budget projects title will be "Materials for Army Weapons and Combat Mobility." Tasks under this item will have functional nomenclature such as "Extreme Temperature Materials" and "Materials for Lightweight Construction." Subtasks will be listed as Metallic, Organic, Inorganic-Nonmetallic, and Composite Materials.

General Trudeau told the MAB that the Army is interested in a "variety of approaches" in the materials field, some of which are:

To find lightweight materials of high strength, and to cut weight in all weapons and equipment.

To find materials that can withstand the extremes of temperature and pressure "we are encountering and desirous of using in this fabulous space age."

To improve process metallurgy and to find new ways of shaping metals, such as "high energy rate forming."

To further the study of electronics and solid state physics.

To find cheap substitutes for potentially critical metals.

"The importance of metals in our missile and rocket development programs," General Trudeau said to the MAB, "is as significant as it is obvious. The Army's PIONEER IV, the first American space probe to enter an orbit around the sun, included a titanium motor case which is still in orbit."

Elastomers play an important role in missile and rocket development, the general emphasized, citing that rubber is a suitable material for tanks, hose linings, gaskets and many other components. He referred to the Army in-house and contract work on nitroso rubber which is of "such promise that a triservice board watches closely."

Another Army achievement in materials research to which General Trudeau pointed was the feat of Prof. H. Tracy Hall at Brigham Young University, working under contract, in developing a silicon carbide "which exhibits almost a 35-fold increase in compressive strength over ordinary hot-pressed silicon carbide."

Within two years, the general said, the Army is aiming to have "adequate machine analysis control of our Army materials program. . . . Then, when we want to analyze, for example, the current Army Metallic Materials Program, the information should be available in a matter of a few hours."

A final innovation in the system of control of the Army Materials Program is the creation of "Technical plans." Described as documents which will present a "comprehensive description" for any subdivision of R&D effort, they will be a "tool for making rapid, efficient decisions."

Highly responsive sources of information on U.S. Army Materials R&D are anticipated within a year, General Trudeau said, pertaining to basic and applied research status, engineering utilization, process development, and facets of relations with MAB, NATO, the Prevention of Deterioration Center, the Plastics Technical Evaluation Center, and other activities.

One of the great needs in materials R&D, it was stressed, is "proper two-way communication, understanding and coordination between the researcher and those who use the materials—the prototype engineer, the fabricator and the designer."

As one approach to the problem of improved communication, the general suggested that "trade associations should create a special type of handbook service, published in a format suitable for use of designers with the negative as well as the positive aspects of materials and processes noted for their guidance."

Secretary of the Army Elvis J. Stahr, jr., offers his well-wishes to new Assistant Secretary of the Army for Installations and Logistics Paul R. Ignatius. Since 1950 Secretary Ignatius had been vice president and director of Harbridge House, Inc., a management and consulting firm which deals in procurement and defense contracting.

Achievement Award Nominees

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mission involving RDT&E (Research, Development, Testing and Engineering) as an additional means of recognition for scientific and engineering achievements."

Criteria require that a recipient of an Army R&D Achievement Award be "directly responsible for a significant scientific or engineering achievement, in that it (1) establishes a scientific basis for subsequent technical improvements of military importance and/or (2) materially improves the Army's technical capability and/or (3) contributes materially to national welfare."

Information Agencies Agree on Dissemination Policy

Cooperation of two of the Federal Government's principal agencies for dissemination of technical information, in a move effective July 1, is directed toward improved service, economy and elimination of duplication of effort.

Under the agreement the Office of Technical Services, United States Department of Commerce, will include in its monthly "U.S. Government Research Reports" the section of the "Technical Abstract Bulletin" (TAB) published by the Armed Services Technical Information Agency (ASTIA) which lists unclassified and unlimited reports.

All ASTIA reports listed in the "U.S. Government Research Reports" will be placed on sale to the general public through the Office of Technical Services (OTS). ASTIA will provide microfilm copies of its reports which will be used by OTS for the production of sales copies. Wherever practicable, OTS will sell inexpensive paper reproduction in lieu of xerox or microfilm copies.

Beginning with the July 1 issue of the "Technical Abstract Bulletin," OTS will use the white section (announcing unclassified and unlimited-distribution reports) for that part of "U.S. Government Research Reports" listing current documents catalogued and abstracted by ASTIA. OTS will discontinue use of PB numbers for ASTIA reports listed in the white section, using instead the AD number (ASTIA document number).

OTS will prepare a supplement section for publication with the white section of TAB, listing documents OTS receives from departments of the Federal Government other than the Department of Defense.

Beginning with the July 1 issue of TAB, each entry carries an OTS price quotation for use by those offices or individuals who may wish to utilize the OTS service.

Reports which ASTIA cannot satisfactorily reproduce or for which reproduction is prohibited for public use will be listed in the buff section of TAB.

(See the June issue of "Army R&D Newsmagazine" for feature article on OTS operations, the April issue for those of ASTIA.)

Redstone Unit Renamed For Broadened Mission

Growth from local to national stature of its mission explains redesignation, effective early in June, of the Army Ordnance Missile Command element at Redstone Arsenal. Its new name is the U.S. Army Ordnance Missile Support Agency (OMSA).

Maj Gen August Schomberg, CG of the AOMC, emphasized that personnel will not be affected by the organizational change.

Commanded by Col Thomas W. Cooke, the OMSA will assume new functions national in scope in addition to providing support services for the Army Ballistic Missile Agency (ABMA), the AOMC Hq., the Guided Missile School, and the George C. Marshall Space Flight Center.

Redstone Arsenal remains the name of the 40,000-acre Army installation at Huntsville, Ala., and the mailing address of all the agencies served by the OMSA.

National missions assigned to OMSA include a missile and rocket inventory control center, computation center, calibration laboratory, and an Army missile patent center.

The control center handles the supply activities and data processing for all Army Ordnance depots responsible for missile and rocket components, and controls stock levels in such depots. Likewise, the patent center is responsible for all patent affairs of AOMC and its elements.

The computation center, which is yet to be constructed, will provide automatic data processing services to elements of AOMC at Redstone Arsenal.

Functions of the calibration laboratory will include monitoring and controlling calibration services of the Army Ordnance District involved in Army missile programs. The laboratory will furnish calibration services related to known standards in AOMC labs and other national activities.

Transportation Chief Appeals For Rapid Mobility Progress

Maj Gen Frank S. Besson, Jr., Chief of Army Transportation, in a recent address, called on the Nation's transportation specialists to close the gap between advancement in the Army's firepower and progress in mobility.

Describing mobility as the field in which the Army has the greatest need to progress, General Besson asserted that mobility of goods and firepower is necessary for the welfare of the United States and also to fulfill U.S. commitments to the Nation's allies.

Warren W. Berning

Aberdeen Scientist Cited By Rocket Society Unit

Outstanding achievement by an Army Ordnance Corps scientist in advancing the state-of-the-art in missiles and rockets was acknowledged May 26 with the presentation of the annual award of the Maryland Section of the American Rocket Society.

Winner of the award was Warren W. Berning, Chief of the Applied Physics Branch, Ballistic Measurements Laboratory, Ballistic Research Laboratories, Aberdeen, Md. The citation acclaimed his achievements in Upper Atmosphere Physics.

An employee of APG since May 1947, Berning previously was employed as an aerodynamist by the McDonnell Corp. and the Curtiss-Wright Corp. following discharge from the Army with the rank of Major. He holds a B.S. degree from the University of Cincinnati (1942) and a Master's degree from the California Institute of Technology (1946).

Professional affiliations of Mr. Berning include: Technical Panel on Rocketry, and the Working Group Ionospheric Research, Technical Panel on Earth Satellites Program, National Academy of Sciences; U.S. Committee on Extension of the Standard Atmosphere; Commission III, International Scientific Radio Union; Joint Services Steering Committee, Control Systems Laboratory, University of Illinois.

Global Communications System

The Army has awarded a $19,101,500 contract to the Western Electric Co. for work on a global military communications system. Called the Universal Integrated Communications System, it will provide switching and terminal facilities for a worldwide network of voice, teletype, radio and other communications. It will serve, the Army said, as a "reliable, completely secure" command channel for military forces.

Promotion List Shows Program Opportunities

Promotion opportunities through participation in the Army Atomic Energy and Research and Development Specialists Program are brought into focus by Department of the Army Circular 624–63, dated May 29, 1961.

Nineteen officers enrolled in the program are listed in the circular for promotion to the rank of lieutenant colonel. Five were selected from the secondary (outstanding) zone of consideration, namely:

Nelson A. Mahone, Jr., and Patrick W. Powers, Office of the Chief of Research and Development; James A. Stuart, Jr., Transportation Research Command; William H. Holcombe, Jr., Command and General Staff College; George F. Smith, Jr., Defense Atomic Support Agency Field Command.

Other AE&R&D Program officers on the promotion list are: Daniel J. Barnwell, Office of the Deputy Chief of Staff for Logistics; Donovan F. Burton, Command and General Staff College; Robert C. Dalzell, Dugway Proving Ground; Ray H. Lee, Redstone Arsenal; Lincoln R. Hayes, Headquarters, ASA Pacific; Bill M. McCormac, Headquarters, Defense Atomic Support Agency; Richard C. Orphan, Picatinny Arsenal;

Daniel Overton, Office Special Weapons Development; Melvin W. Shroeder, Redstone Arsenal; Alois L. Steinback, Combat Surveillance Agency; Ben T. Stephens, Ordnance Depot, Pueblo, Colo.; Patrick G. Wardell, Defense Atomic Support Agency Field Command; Kent T. Woodward, student, University of Rochester; Gerald B. Hoover, Air Defense School, Fort Bliss.

Rocket Belt Demonstrated At Transportation Center

An experimental rocket belt developed for the Army's Transportation Research Command enables a man to take off from the ground and fly above land and water as far as 360 feet.

The rocket belt, which was demonstrated recently at Fort Eustis, Va., consists of a twin-jet hydrogen peroxide propulsion system mounted on a fiber-glass corset that fits around the back and hips of the operator.

When activated by the pilot's controls, hydrogen peroxide is forced under pressure into a gas generator, where it contacts a catalyst and turns into steam. The steam escapes through two rocket nozzles, providing thrust. The main thrust is directed toward the ground for lift, while jet deflectors provide thrust for yaw control at the direction of the operator.

20-Year Technological Forecasts Being Distributed

Technological forecasts prepared by each of the Technical Services to indicate anticipated progress for the next 20 years are being distributed.

An overall Army-wide forecast is being prepared by the Army Research Office and is expected to be off the press this month. Distribution of this forecast and of the Technical Services' forecasts will be limited to Army and other interested Government agencies.

Representative of greatly increased emphasis on the relatively new art in the Army of forecasting technological capabilities, intended to assure continued superiority over any potential enemy, the forecasts were directed by the Chief of Research and Development.

As stated in the April issue of the *Army R&D Newsmagazine*, the purpose of the forecasts is: To aid long-range Army planners in formulating new concepts and requirements, within as realistic a time structure as is foreseeable.

Review of the Technical Services' forecasts by the Army Research Office prior to publication prompted the action officer to comment that they constitute a "substantial improvement over previous Army efforts in this important area."

The Army Research Office, it was stated, intends to support research on the analysis and continued improvement of forecasting methods, and will encourage the Technical Services to make similar efforts. Army personnel engaged in preparation of forecasts will meet as necessary to develop improved techniques and procedures.

The Army-wide forecast will serve as an introduction to the subject of technological forecasting. It will encompass subjects of broad interest not covered in the individual Technical Services' forecasts, including those stretching across interdisciplinary areas of science.

R&D Reservists May Attend Navy-Sponsored Seminars

Seminars conducted for reserve officers under the sponsorship of the Chief of Naval Operations which members of Army R&D Reserve Units may attend on a quota basis include:

Nuclear Science Seminar, Idaho Falls, Idaho, July 24; Research Methods Seminar, Seattle, Wash., Aug. 14; Planning and Management Seminar, Princeton, N.J., Aug. 21; Nuclear Science Seminar, Brookhaven, Upton, Long Island, N.Y., Sept. 18; Nuclear Science Seminar, Oak Ridge, Tenn., Nov. 27.

Research Reserve Submarine and Driving Medicine Seminar, New London, Conn., Mar. 19, 1962; Electronic Computer Seminar, Stewart Field, Newburgh, N.Y., Apr. 2, 1962; Office of Naval Research Seminar, ONR, Washington, D.C., June 4, 1962; and Training Device Seminar, USN Training Device Center, Port Washington, N.Y., June 11, 1962.

R&D Reservist Reduces Bacterial Diagnosis Time

A new technique in bacteriological sensitivity testing, reducing diagnosis time of diseases caused by bacteria, is reported by Lt Col (Dr.) Alexander Kimler, a member of the 2391st U.S. Army Reserve R&D Training Unit, Washington, D. C.

Completed under R&D Project MED–365, "A Rapid, in Vitro, Bacterial, Disc Sensitivity Technique," the method has slashed reporting time from 16-24 hours to 2-6 hours. The result is earlier treatment of the patient.

Details of Col Kimler's experiments are published in the May issue of *Military Medicine*.

While performing his 2-week active duty tour with the Army Research Office, Col Kimler expressed his belief that a faster and simpler medium for sensitivity testing could be developed. Encouraged to pursue his idea, he embarked on a series of experiments as an approved USAR R&D unit project upon return to his civilian duties. He is Chief, Microbiology Section, Germfree Research, Walter Reed Army Institute of Research, Washington, D. C.

Because of its relative simplicity, the Kimler technique saves man-hours and efforts of laboratory technicians. A new medium (tryptose agar with thiamine [Difco]), developed during his experiments, speeds growth and usually changes color of bacteria.

NASA Picks WSMR Technical Director for Past 15 Years

Ozro "Ozzie" M. Covington, Technical Director of the Signal Corps Missile Support Agency at the White Sands Missile Range since 1946, resigned recently to join the staff of the National Aeronautics and Space Administration.

A major portion of Covington's new job is to direct the 15 stations situated around the world which will track and to some extent control the Project Mercury capsule.

Succeeding Covington at White Sands is Henry Thompson, formerly Chief Scientist of the Missile Meteorology Division of the Signal Agency.

Covington came to the job at White Sands 15 years ago in control of 10 men and two radar vans. By this year he was supplying technical guidance for more than 2,000 soldier-technicians and civilians operating a $100 million communications-electronics plant spread over 5,600 square miles.

In 1954 he was "loaned" to the Ordnance Corps for eight months to assist in setting up the vast organization now known as the Integrated Missile Range. In 1958 he received the highest honor the U.S. Army can award a civilian, the Decoration for Exceptional Civilian Service, for his accomplishments in the field of electronic devices.

Known as "Ozzie" by Generals as well as truck drivers, Covington's services to the area prompted the nearby town of Las Cruces, N. Mex., to hold an "Ozzie Covington" day before he left.

Ozro M. Covington

Henry Thompson

Commanders Consider Methods of Improving Tech Training Courses

How to improve the effectiveness of Army technical training was considered at the first Technical Service Training Commanders' Conference held recently at Aberdeen Proving Ground, Md.

Brig Gen John H. Weber, Commanding General of the host installation, welcomed 60 delegates representing the Technical Services, Continental Army Command, Office of the Deputy Chief of Staff for Logistics, and the Human Resources Research Office (HumRRO). Brig Gen Robert E. Peters, CG of the Training Command, presided.

As the keynote speaker Dr. William A. McClelland, Deputy Director for General Operations and Personnel, HumRRO, discussed "How Far Should Training Be Automated." He suggested "judicious adoption of automated training," explaining that the basis of decision should be comparison of cost to increased student performance capability.

Maj Gen H. F. Bigelow, Deputy Chief of Ordnance, made a presentation on responsibilities of the Technical Services to the combat arms.

Seminars were conducted on various phases of technical training problems. During the evaluation period it was agreed that the Technical Service Training Commanders' Conference should be held annually. The U.S. Army Transportation School at Fort Eustis, Va., will host the 1962 meet.

AOMC Seeks to Cut Costs By Value Analysis Course

Thirty-nine Army personnel and one contractor representative recently completed the first formal course by the Army Ordnance Missile Command on Value Analysis-Engineering.

The students, representing AOMC, the Army Ballistic Missile Agency, the Army Rocket and Guided Missile Agency, and the Thiokol Chemical Corp., were given 40 hours of instruction at the Redstone Arsenal, Ala.

Items which the Army felt might be produced at less cost if re-evaluated were given to the students for consideration. According to Arthur E. Harvey, Chief of the ABMA Value Analysis Office, "the projects selected represented areas in which we need to conduct value analysis."

Besides giving students an opportunity to work with problems which may confront them in their jobs, Harvey believes that "solutions offered by students will result in some money-saving refinement."

Dr. Youmans Presented Exceptional Service Award

The highest award the Secretary of the Army is authorized to give to a career service civilian—the Decoration for Exceptional Civilian Service—was presented recently to Dr. John B. Youmans in the Army Surgeon General's Office, Washington, D. C.

Presently Director of the American Medical Association's Division of Scientific Activities, Dr. Youmans received the award for his exceptional performance of duty as Technical Director of Research for the U. S. Army Medical Research and Development Command from September 1958 to September 1960. The citation also commended him for his internationally recognized accomplishments in the medical and scientific world.

Burn in Mukwonago, Wis., Dr. Youmans received his bachelor and Master of Arts degree from the University of Wisconsin and his M.D. degree from Johns Hopkins University School of Medicine. He was on the Vanderbilt Medical School faculty from 1927 until he was commissioned in the Army Medical Service in 1944.

During World War II he served as Director of the Nutrition Division, Preventive Medicine Service, in the Army Surgeon General's Office. He also served in the China, Pacific and European Theaters, where he conducted nutrition surveys.

Dr. John B. Youmans

After retiring from the Army in 1946, Dr. Youmans became Dean and Professor of Medicine at the University of Illinois College of Medicine. In 1950 he returned to Vanderbilt as Dean and Professor of Medicine until his resignation in 1958.

Spotting Flashbulb Devised to Aid ZEUS Tests

More than 70 successful tests of a high-powered "flashbulb" that can be seen 40 miles away have been carried out at White Sands Missile Range, N. Mex., in connection with the Army's NIKE ZEUS anti-missile-missile program.

Forthcoming ZEUS tests over the Pacific against a set of specially developed target rockets, then against true intercontinental ballistic missiles, will employ the spotting charge.

Activated at the instant the missile warhead burst command is received, the brilliant flash can be recorded on instrumentation cameras positioned far away.

Comparison of film records will tell exactly how far from the target the ZEUS warhead detonated—so potent is the warhead that a direct contact of missile against missile is not necessary to destroy the target.

The flash also will show that burst command was received.

Surprisingly small for the burst of light it puts out—the models tested at WSMR ranged in size from a 2-inch diameter cylinder four inches high with a 4-inch cap to a 5-inch straight sided cylinder—the spotting device is filled with a flash powder composition over a standard detonator.

Activation of the charge will not damage the missile or affect its trajectory. Research and development was conducted by Picatinny Arsenal under authorization of the Army Rocket and Guided Missile Agency, an element of the Army Ordnance Missile Command.

Electronic Advisers View R&D Progress at Picatinny

The Advisory Group on Electronic Parts, representing the Office of the Director of Defense, Research and Engineering, recently visited Picatinny Arsenal, Dover, N.J.

One of the main purposes of the group is to insure that electronic research and development programs are under continuous review, not only by the military but also by recognized experts from industry.

During a tour of Picatinny facilities the group gave special attention to electronics in atomic warheads, airborne telemetry, special weapons environmental testing and other instrumentation.

Members were also briefed on the Plastics Technical Evaluation Center (PLASTEC) established at Picatinny last year by the Department of Defense to stimulate research.

President's Message Cited As Stressing Army Mission

Pertinent to the Army Research and Development mission is the following statement by Under Secretary of the Army Stephen Ailes:

"In his Special Message to Congress on May 25 on 'urgent national needs,' the President directed three actions which will significantly improve the readiness of Army combat forces.

"The authority to undertake a complete reorganization and modernization of the Army's divisional structure offers tremendous opportunity to develop the Army's capabilities to cope with all forms of warfare.

"The President's request for an additional $100 million for procurement of new equipment in FY '62 will permit faster modernization of the Army.

"Finally, the President encouraged the completion of plans to strengthen the readiness of Reserve Forces. This action will greatly increase the Army's capability to deploy combat forces in an emergency.

"These decisions by the President are further recognition of the importance and versatility of Army forces. They constitute a new challenge to the Army to develop its capabilities to the utmost."

Col Wishart Appointed ARGMA Deputy Chief

Col Henry H. Wishart has been named Deputy Commander of the Army Rocket and Guided Missile Agency, Huntsville, Ala., by Brig Gen John G. Zierdt, Agency Commander.

Col Wishart, Director of ARGMA's Industrial Operations since November 1958, replaced Col R. O. Lehtonen who departed for Formosa on June 12.

Chief of Logistics Division, Joint MAAG, Seoul, Korea, from July 1957 to September 1958, Col Wishart was graduated from the Industrial College of the Armed Forces in Washington, D.C., in 1957, and from the Command and General Staff College at Fort Leavenworth, Kans., in 1950. He holds a B.S. degree in administration from the University of Southern California, and was graduated from the Harvard Military Academy of Los Angeles.

The Colonel's World War II experience included 33 months in the Pacific Theater and Japan. He was commanding officer of the 352nd Ordnance Battalion from 1943 to 1944, and CO of the 57th Ordnance Group from 1944 to 1945. From 1947 to 1949 he served as Ordnance Officer, Headquarters European Command.

Army, Air Force Agree on JUPITER Training

The Army and the Air Force have extended until December 1963 an arrangement whereby the Army Ordnance Guided Missile School at Redstone Arsenal, Ala., conducts individual and crew training of U.S. Air Force and NATO country students on the JUPITER intermediate-range ballistic missile.

The 1,500-mile weapon developed by the Army and assigned to the operational control of the Air Force is being deployed in Europe to strengthen defenses of the North Atlantic Treaty Organization.

The program, which avoids duplication of costly equipment and specialized technical instructors, is administered jointly by the Army Ordnance Training Command, Aberdeen, Md., and the Air Training Command, Randolph Air Force Base, Tex. It is financed by the Air Force.

Complete facilities for training JUPITER technicians had already been provided at the Army Ordnance Guided Missile School when JUPITER was transferred to the Air Force, making it logical that the School should train the Air Force technicians.

To date, some 1,600 U.S. and Allied students have received individual training on the JUPITER. By 1963, the total will have risen to about 2,600 technicians trained on all aspects of the operation and maintenance of the system.

BANSHEE Gauges Effect Of U.S. Missile Systems

Evaluation of the effectiveness of current Department of Defense missile systems is the objective of a research program designated Project BANSHEE, sponsored by the DOD Atomic Support Agency with assistance from the Army Ballistic Research Laboratory, Aberdeen, Md.

Field tests initiated in June at the Army's White Sands (N. Mex.) Missile Range are designed to verify both high energy and nuclear theoretical calculations of blast behavior at high altitudes.

The program involves detonation of chemical high explosives carried aloft by large balloons. Fully inflated, the largest balloon measures 240 feet in diameter. With instrumentation train attached, it is as long as a football field.

After the blast, a parachute brings the sensors and other instruments back to earth for evaluation by scientists of the Army, Air Force and Navy.

Federal Aviation Agency approval was obtained for test firings to be made at the desired altitudes above the White Sands Missile Range.

Phase I involved release of 10 balloons with explosives. Phase II called for release of 10 more instrumented balloons, without explosive charges, to be used as targets for NIKE HERCULES ground-to-air missiles employing conventional warheads.

Brig Gen Meyer Heads USASTC, Brig Gen Harrison Retires

Brig Gen Richard J. Meyer, Signal Officer, U.S. Army in Europe, has been reassigned as Commanding General, U.S. Army Signal Training Center, Fort Gordon, Ga., effective in June.

Brig Gen Richard H. Harrison, Deputy Chief, Defense Atomic Support Agency, Washington, D.C., retired on June 30, after more than 30 years of active duty.

BANSHEE instrument train will parachute to earth for test evaluaton.

Examining recently developed 40 mm. grenade launcher at Picatinny Arsenal are, left to right, Brig Gen William F. Ryan, Col Russell R. Klanderman, Maj Gen Dwight E. Beach and Maj Gen William K. Ghormley.

New OCRD Chiefs Inspect Picatinny Arsenal Program

Maj Gen Dwight E. Beach, Deputy Chief, Office of Research and Development, and Brig Gen William F. Ryan, Director of Facilities, Manpower and Operations, both assigned to OCRD in May, made a recent inspection tour of the Ordnance Special Weapons-Ammunition Command (OSWAC) Headquarters at Picatinny Arsenal, N.J.

As guests of Maj Gen William K. Ghormley, Commanding General, OSWAC, and Col Russell R. Klanderman, Picatinny Arsenal Commander, the visitors were briefed on the latest nuclear and conventional research and engineering programs at the Arsenal.

The tour included examination of the Davy Crockett nuclear weapon system, the atomic artillery shell and demolition programs and the warhead development programs for both the Sergeant and Nike-Zeus missiles. Other topics included the battlefield illumination system, seismic detection devices, rocket propulsion and special warfare items.

A highlight of the tour was a demonstration of the recently developed 40 mm. grenade launcher, which both visiting generals fired.

WSMR Marks 149th Birthday Of U.S. Army Ordnance Corps

The U.S. Army Ordnance Corps recently observed its 149th anniversary at White Sands Missile Range, N. Mex.

Brig Gen John G. Shinkle, Commanding General of White Sands, issued a short statement to the military and civilian personnel at the range, praising them for "keeping pace with technological progress and production of the world's best weapons for the world's finest soldiers.

"Each of you, along with the science-industry team can be justly proud of the progress made in the Corps through the years," he said.

The primary role of White Sands is the testing and development of guided and ballistic missiles. Nearly all the Army's operational missiles were at one time being developed at White Sands.

$14,693,500 Contract Calls For M-14 Rifles, SD-5 Drones

Contracts totaling $14,693,500 have been awarded for procurement of the Army's new M-14 rifle and SD-5 drones.

The Boston Ordnance District awarded a $6,818,500 contract for 133,000 M-14 rifles and spare parts to Harrington and Richardson, Inc., of Worcester, Mass. The Fort Monmouth, N.J., Procurement Office awarded a $7,875,000 contract to Fairchild Engine and Airplane Corp., of Hagerstown, Md., for three SD-5 surveillance drones.

Helicopter Tests Prelude 10-Year Procurement Plan

Army evaluation tests of helicopters manufactured by the Bell Helicopter Corp., Fort Worth, Tex., and Hiller Aircraft Corp., Palo Alto, Calif., are expected to be followed by selection of a design for some 4,000 observation aircraft to be procured over the next decade at an estimated cost of $200 million.

The plane sought by the Army will be a single rotor, 4-place helicopter. At present, the Army said, the Bell D-250 and Hiller model 1100 are considered most suitable for meeting its reconnaissance and mobility needs.

Eventually, officials said, the new light observation helicopter will replace three other Army aircraft—the L-19 fixed wing, the Bell H-13 helicopter, and Hiller's H-23 helicopter.

First purchase of the light observation helicopter probably will come in mid-1963, and troops will begin getting them in quantity by 1965, Army officials estimated.

AOMC Planning Solid Rocket Test Stand

The Army plans to construct a test facility for captive firing solid fuel rocket motors developing large thrust at Redstone Arsenal, home of the Army Ordnance Missile Command (AOMC), Huntsville, Ala.

Maj Gen August Schomburg, Commanding General of AOMC, said first planned use of the new facility will be captive firings of motors for the Army's NIKE ZEUS anti-missile-missile now in development.

The General said the new test stand will also be able to accommodate motor tests for any other Army solid fuel missile. Motors tested on the new facility will be fired in a horizontal position. The structure has been designed to absorb the horizontal thrust of rocket motors of present and forecast magnitude with an adequate safety factor assured for all firings.

Additional structures to be built include a reinforced concrete, earth-covered terminal building, a galvanized arch culvert or reinforced concrete tunnel connecting the terminal building and the control building approximately 1,200 feet away, a fire protection system, utilities, and access road and a parking area. An existing structure will be modified into a facility for engineering support of the test stand.

Bids for building the new structure were opened June 8 at the Corps of Engineers District Office, Mobile, Ala. Bids were accepted from small business firms only, in the interest of assuring that a fair proportion of Government procurement is placed with such concerns, an AOMC official said.

AOMC Invites Industry to Offer New Ideas, Methods

Assistance from American industry in the field of missile and rocket research is being solicited by the U.S. Army Ordnance Missile Command, Huntsville, Ala. Maj Gen August Schomburg, Commanding General of AOMC, recently cited the "need for completely new ideas and methods, as well as for solution of existing problems."

With an annual budget of approximately $1.5 billion, the Missile Command is an administrator of the Ordnance Corps' Qualitative Development Requirements Information (QRDI) program. The program seeks to inform industry of what the Army needs in the way of basic and supporting research.

More than 90 percent of AOMC's annual expenditure is with private industry, mostly for production and procurement, though a sizable portion finances supporting research. In the past two years, the Ordnance Corps has awarded more than $2 million in research contracts to 28 companies.

Any individual, firm, partnership or corporation which produces evidence of a research and development capability, obtains a security clearance and submits qualification information to the appropriate Ordnance District, is eligible to receive the QDRI list.

Currently, approximately 1,000 firms, of which almost 50 percent are classed as small business, are qualified to participate in the program.

Current areas of interests for the Ordnance Corps include high temperature studies, communications, propulsion systems, reliability assurance, automation, improved fabrication methods, and atmospheric phenomena and meteorology.

General Schomburg urged all industrial firms to evaluate their research potential and notify the appropriate district or agency if they are interested in performing research for the Ordnance Corps.

In addition to the 11 Ordnance Districts, firms may contact the Assistant Chief of Staff for Research and Development, AOMC, or the Research and Development Operations of the Army Rocket and Guided Missile Agency and the Army Ballistic Missile Agency, all at Redstone Arsenal.

Nuclear Damage Assessment Center Instituted

An interservice Damage Assessment Center, capable of providing special information and nuclear damage assessments in fractions of seconds, will become operational this month in the Pentagon, Washington, D.C.

Designed and developed under recent contracts totaling $5.5 million awarded by the Defense Atomic Support Agency, the Center will facilitate vital decisions concerning nuclear warfare.

The Center will be supported by a scientific computer and an automated display system. During peacetime it will examine the military forces and economic resources of the United States and its allies, and of potential enemies, to determine hazards and vulnerabilities of such forces and resources in relation to nuclear attack.

During war the Center would assess damage from nuclear attack as well as inventory a nation's remaining resources to continue the war effort.

Contractors are the System Development Corp., Santa Monica, Calif., ($3 million for computer model development and program); Control Data Corp., Minneapolis, Minn., ($1.5 million for computer system); and Ramo-Wooldridge Division of Thompson-Ramo-Wooldridge Corp., Los Angeles, Calif., ($1 million for the display system).

Secretary of Defense Names Davenport as Assistant

Roy K. Davenport has been appointed by the Secretary of Defense as Special Assistant for Personnel in the Office of the Under Secretary of the Army.

The appointment is in line with the recent action to give Army personnel matters increased emphasis by eliminating the position of Assistant Secretary of the Army for Manpower, Personnel and Reserve Forces and shifting the functions to the Office of the Under Secretary of the Army.

Mr. Davenport, who was Military Personnel Management Specialist in the Office of the Adjutant General, will work on Army personnel programs and effect coordination in personnel management matters with other governmental agencies and with private industry.

In addition to recommending policies for Army personnel programs, Mr. Davenport has been assigned the responsibility to study the effectiveness of such programs in relation to their objectives and establish plans for personnel research.

ZEUS System Tracks ATLAS in Atlantic

Capability of the NIKE ZEUS target-track radar stationed on Ascension Island was demonstrated successfully in its initial test on May 27 against an ATLAS intercontinental ballistic missile.

The potentiality of the target-track radar, one of four basic radars used in the NIKE ZEUS system, was indicated by the huge screen which showed it "locked on" the missile as it dived toward its target.

Located midway between South America and Africa, Ascension Island is about 4,500 miles down range from Cape Canaveral, from which the missile was fired. The radar test station is manned by a staff of 40.

Brig Gen John G. Zierdt, Commanding General of the Army Rocket and Guided Missile Agency, which has technical supervision over the NIKE ZEUS developmental program, termed the tracking feat a significant achievement.

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Ascension Island dome-enclosed radar.

Console crew tracks ATLAS down range.

Trudeau Terms Management of "Supreme Concern" in Army R&D

"Management is a subject of supreme concern in military research and development today."

Lt Gen Arthur G. Trudeau, Chief of Research and Development, Department of the Army, stated this conviction at a Personnel Management for Executive Conferences at Asbury Park, N.J., and reemphasized it recently in several other keynote speeches.

"So fast is current scientific progress—today's wonder is tomorrow's relic—that the success we obtain in Army R&D," General Trudeau said, "depends as never before upon how well our many diverse efforts are planned, directed and controlled. . . .

"Management, here, is the art of providing the optimum opportunity for creative people — scientists, engineers, and military — to produce changes and make progress. . . .

"The battleline is shifting more and more to the Army-Science-Industry team and what it is able to develop. I can assure you," General Trudeau told the personnel management conferees, "that we, in that team, have but one sense of mission—the realization that national security depends as never before upon the imagination and boldness with which we acquire and utilize new scientific discoveries and industrial techniques for our national defense. . . ."

Pointing out that approximately one-fourth of Army R&D funds are used for R&D actually performed within the Army's more than 75 in-house laboratories and arsenals, and three-fourths for work performed under contracts and grants in the outside scientific community and industry, General Trudeau said:

"The problem confronting the military R&D manager in this area is the establishment of an equitable balance between in-house and contract work. Although in-house capability pays high dividends in the form of creating and maintaining the Army's technical and administrative competence in the design, evaluation and direction of projects, we appreciate the necessity for maintaining a balance between our own competence and cost and the competence and cost in private industry.

"Within the Army, I am convinced that little or no expansion should be authorized (although coordination must be further improved) in our in-house R&D facilities and activities, and that we must make maximum use of the competence and experience of qualified industries and laboratories.

"Simplicity and reliability must be prime considerations in all development planning. Since World War II there has been an increasing tendency to develop equipment along more complex and sophisticated lines. This has led to increased cost, decreased reliability, and untenable maintenance problems for the using troops.

"The more complex the system, the more difficult for human action to adapt the device to the military environment. Some weapons planners persist in developing systems of fantastic complexity. The result can be an amazingly sophisticated device of marvelous ingenuity, but of high cost and little practical value on the battlefield.

"This is a trend which must be resisted at all costs. It is the [Army R&D] manager's mission to stop it—and good management can stop it, early."

After discussing various recently developed Army weapons and equipment which in his opinion are the result of management motivated by appreciation for simplicity of design, reliability and responsiveness to critical needs, General Trudeau stated:

"The R&D manager must look objectively at each development program, beginning with its concept, to identify the reliability problem which he can expect to encounter. Reliability must be an integral part of every decision that is made throughout the entire life cycle of a project—design, fabrication, test, and finally through production. It is the manager's job to make those decisions.

"Another serious problem is *man-machine compatibility.* This whole question must be weighed at the beginning of a project—in the concept and design feasibility studies — and continued throughout development.

"Operating and maintenance problems must be capable of solution by the normal cross section of available manpower. The newest and most advanced weapon of war is no better than the man controlling it—and the R&D manager can forget this only at his peril!

"Now, without a doubt, another important, challenging and, in certain respects, frustrating responsibility of the Army R&D manager is the necessity to eliminate those projects which are nonproductive, or duplicatory, or which provide only marginal improvement over existing weapons and equipment, or which will result in materiel that will be obviously obsolescent by the time it is available for troop use. Long- lead time in the United States R&D efforts accentuates this problem.

"The benefits of a successful elimination program are extremely important but the resistance of enthusiasts —be they military, scientific, industrial or political—is hard to overcome. Costly development of certain equipment which may never be produced or used is wasteful of our limited resources.

"Elimination of the least profitable projects is essential to giving us opportunity to reprogram resources toward vital, high priority work. We are making continued, concerted efforts within the Army to identify and eliminate questionable tasks—and our record to date is excellent—unequaled, in fact. We have terminated about 350 projects and tasks from 1958 through 1960.

"The type of work which *may* be desirable but unquestionably is unnecessary must go, and it is an important job of the R&D manager to speed its

Rolling Liquid Transporters, each with a capacity of 500 gallons, were designed for the Transportation Corps to serve as mobile gas stations for refueling vehicles of fast-moving combat units. Under test by their maker, the transporters can be towed over almost any kind of terrain at speeds up to 45 m.p.h. They can float, be shipped by air, dropped by parachute.

departure. We are leaving no stone unturned to do so.

"This insistence on early termination of marginal projects and tasks is neither intended nor designed to retard or stifle initiative, freedom of experimentation, or the conduct of scientific studies. Our goal is the most effective utilization of resources and assurance that our total R&D effort is directed toward the early fulfillment of the Army's important materiel requirements.

"Another problem which plagues the R&D manager is building up and maintaining the proper amount of momentum in all fields of endeavor. If we take too big a technological jump in a development project, we are certain to meet with a series of new problems that demand both additional time and money for solution. To guard against this trend requires the finest qualities of judgment. . . .

"My position is that we should focus our efforts more realistically in designing equipment; make it simple, reliable and rugged—as near perfect as time and money permit—and that's all—then, freeze and build it. . . .

"I am convinced, too, that increased effort must be made to inspire the most creative, fertile and facile minds of our younger scientists to focus on pure research. I suggest that thought be given to a program that would discover and funnel into laboratories for pure research those exceptional persons who can contribute to our long-range national programs.

"This will be resisted by those that control such talent, but unless scientific dedication is aimed at higher goals than the four "sweet peas"—prestige, power, politics and pay—we are doomed. It would be hard to name 100 scientists who have really made great breakthroughs in this last decade.

". . . From my vantage point, I can see the particular need for more creativity in this country to provide the ideas which must sustain us in our constant efforts to advance world peace and progress. By creativity, I refer to the creative spirit which, for example, produced all the scientific discoveries that have enabled our technologists and engineers to shape and structure the greatest country in the world.

"We need creativity throughout the texture of our society, spread to all classes by the leavening and inspiration of educated and dedicated leaders. We need creativity in all fields—in science, in industry, in agriculture, and in the military services—if we are ever to achieve the really important research discoveries and translate them into practicality. . . ."

Sutton Appointed Director of Waterways Station

Newly assigned as Director of the U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss., is Col Alexander G. Sutton, Jr. He will report for duty in July following his graduation from the U.S. Army War College, Carlisle Barracks, Pa.

Col Alexander G. Sutton, Jr.

Col Edmund H. Lang, Director of the Station since August 1958, has been assigned overseas.

Born in Dallas, Tex., and graduated from Texas A&M College in 1935 with a B.S. degree in Engineering, Col Sutton is 47 years old. In World War II he served in Europe as Assistant Engineer and Assistant G-3, Headquarters, Third Army, as Commanding Officer, 275th Engineer Battalion, and Division Engineer, 75th Infantry Division. After attending the Officers Advanced Course at the Engineer School, Fort Belvoir, Va., he served in Europe from 1948 to 1951.

Upon his return to the United States, Col Sutton attended the Command and General Staff College, Fort Leavenworth, Kans. Assigned to the Armed Forces Special Weapons Project, Killeen, Tex., he was transferred to headquarters of this project in Washington, D.C., from 1954 to 1957. Following assignments in Iceland and Texas, he attended the Army War College in 1960.

Tests Show Brain Responds to Tasks During Sleep

Experiments by Lt John T. Hammack and Dr. Allen Granda of the Walter Reed Army Institute of Research have demonstrated that the brain stays alert and able to direct complicated activities even during deep sleep.

The experiments were performed with the aid of five volunteer soldiers, whose brain activity was monitored by an electroencephalogram machine. During the 2-hour test each sleeping subject went through alternating "scheduled activity" and "time out" periods.

During the activity period each subject was required to perform certain activities to avoid an electric shock and to earn a 5- to 8-minute period during which he could sleep undisturbed.

This rather complicated activity, the experimenters found, could be carried on after a learning period while the subjects remained in profound slumber. The brain still knew what to do and when to do it.

Adhesives Symposium Slated At Picatinny Arsenal in Sept.

Government and contractor engineers will attend a 2-day symposium on "Modern Structural Adhesives Technology" at the U.S. Army Ordnance Corps Picatinny Arsenal, Dover, N.J., Sept. 27-28.

Organized by the Arsenal's Plastics and Packaging Laboratory, which has the mission for the Army's R&D adhesives program, the meeting will inform design personnel of the latest technological developments.

Four sessions will deal with: minimizing stress on adhesives and surface preparations for adhesive bonding; selection of adhesives and process control during application setting of adhesive bonds; special applications of adhesives in Ordnance; and recent developments in the adhesives field.

Army Tropic Unit Recognized For Schistosomiasis Research

Investigations of the disease of schistosomiasis conducted by personnel at the U.S. Army Tropical Research Medical Laboratory in Puerto Rico have earned the Isaac Gonzalez-Martinez Award for the third consecutive year.

Winner for 1961 is Luis Berrios-Duran. In 1960 the award was made to Dr. Lawrence S. Ritchie and in 1959 to Cmdr L. A. Jachowski, Dr. Jose Oliver-Gonzalez and Dr. J. A. Pons.

Selections are made annually by the Puerto Rican Committee for Bilharzia Control. The award is named after Dr. Isaac Gonzalez-Martinez who demonstrated the occurrence of the disease in 1904 and spent his life studying its cause and treatment.

WSMR Spending $940,000 For New Missile Trackers

A complex of specialized optical tracking instruments and auxiliary equipment is scheduled for installation to support the Nation's stepped-up missile program at White Sands Missile Range, N. Mex.

Delivery of the first three instruments included in a $940,000 contract for 13 Contraves high speed photographing systems is projected for August. Three instruments are to be delivered in September, three in October and four in November.

The precision Contraves cinetheodolites, equipped with 60- and 120-inch focal ranges, are designed for requirements peculiar to the testing center and will supplement existing facilities.

Intended to facilitate missile-launch coverage, the new system provides higher degree of accuracy, better testing information, and is expected to effect substantial operational savings.

Likened to power-steering on a car, the joy-stick tracking control system enables one operator to control both azimuth and elevation movements of the instrument to follow missiles in flight.

The first three instruments will be located at the Small Missile Range in support of two new projects, Red Eye and Shillelagh. Red Eye is a surface-to-air, shoulder-fired, bazooka-type air defense weapon. Shillelagh is a lightweight surface-to-surface missile intended for close-in support of troops.

Article Reviews Problems Of Gas Turbine Engines

An informative article on the advantages and developmental problems of gas turbine engines—regarded by many engineers as the engine of the future for a wide variety of ground and air vehicle requirements—appears in the April issue of *Eastern Truck News*.

The article reviews recent statements by Brig Gen George W. Power, Director of Developments, Office of the Chief of Research and Development, regarding the Army's objectives in development of gas turbine engines.

Differences in design of gas turbine engines being developed by General Motors (Allison Division), Chrysler Corp., International Harvester and other companies are discussed in the article. Ford Motor Co., for example, has developed a 650-pound engine that delivers 300 hp.

Reprints of the article are available through *Eastern Truck News*, Urban Publishers, Inc., 303 Park Ave. South, New York 10, N.Y.

APG Trains Inductees as Soldier Scientists

Maximum utilization of inductees and enlistees to maintain a constant flow of qualified soldier-scientists for the research and development program at Aberdeen Proving Ground, Md., demonstrates the thoroughness of the U.S. Army Ordnance Corps program in this field.

Four Aberdeen soldier-scientists who are valuable, contributing members of the military-civilian research and development team typify the many specially trained soldiers working in key programs in the laboratories of this "Home of Army Ordnance."

Specialist Paul Netherwood checks balistics high-voltage power system.

Specialist William V. Cramer of the Ballistics Measurements Laboratory has drawn praise from John Brown and Emmett Pybus for his work in modifying the Peltier dewpoint hygrometer to give more accurate and complete data. The two Proving Ground civilian scientists used a hygrometer, one of the key tools used to unlock the mysteries of the stratosphere where rockets and missiles operate, in recent successful exploratory studies of the upper atmosphere in the antarctic.

Sp/4 Terry Erwin is a proof director with the Tank Ammunition Branch. Tests which he has the responsibility of supervising and coordinating delve into the strengths and weaknesses of the various characteristics of ammunition. He also writes directives for the climatic testing of ammunition at Yuma Test Station, Ariz., and Fort Churchill, Manitoba, Canada.

SP/5 Paul H. Netherwood, Jr., assists in calibrating standard measuring devices used to measure the extremes of high pressure at the surface of an exploding bomb. Results are reflected in improved designs. An error in calibration on a gauge may result in a "misfire" or "dud" round in combat. Specialist Netherwood's job is to help members of the soldier-civilian research team assure the required degree of accuracy.

Pvt George Ayazides recently came to the Human Engineering Laboratories with a college background in engineering and is now being given on-the-job training to fit him for a position alongside the soldiers and civilians engaged in man-machine compatibility research. He has observed a program designed to provide a guide for installing cameras in rocket and missile nose cones and a test of new type of data recorder for human activities in various environments.

In the Development and Proof Services Ballistic Research Laboratories, soldier-scientists are being used as full-fledged members of the military-civilian research team that has done so much successful work for the Ordnance Corps.

TRECOM Eliminates Shock From Helicopters

The problem of ground personnel receiving electrical shocks from hovering helicopters has been solved through research sponsored by the Army's Transportation Research Command at Fort Eustis, Va.

Developed by the Cornell Aeronautical Laboratory, a compact and relatively lightweight unit allows a helicopter pilot to flip a switch and eliminate the electrical "potential difference" between the craft and the ground.

Helicopters, like airplanes, become charged with static electricity as they move through the atmosphere. These charges are removed from planes by static dischargers on the wingtips. When the plane lands, it is "grounded." But helicopters move too slowly for static dischargers to be effective, and can have a high electrical potential when hovering.

Under these conditions several thousand volts can flow through a ground crew member reaching up to unload or load a hovering helicopter, by completing an electrical circuit between the craft and ground. Many crewmen have been seriously injured by the discharge circuit.

The unit is being tested in California at Edwards Air Force Base because a greater variety of helicopters is available and higher electrical charges are created in dry climates.

Provocative Ponderables

". . . Two occupational hazards connected with service on the Army staff that visits to the field are needed to overcome are: regarding the Army as composed primarily of master sergeants and lieutenant colonels, all about 40 years of age; and that problems tend to become insurmountably complex when dealt with by mental exercise and exclusively on paper."—General George H. Decker, Chief of Staff, U.S. Army.

* * *

"There is nothing more important in research than recognizing a dead horse early and taking it out and burying it with the least possible ceremony."—Maj Gen Marvin C. Demler, Director of Aerospace Systems Development, Department of the Air Force.

* * *

"My philosophy is to freeze a 'good' design early, and get that weapon built! The cult of superperfection has no fascination for me. In national defense we cannot afford it, either in time or money. . . . One of the major problems we live with is that . . . enthusiasts are attempting to crank into military equipment a plethora of desirable, but unnecessary, refinements."—Lt Gen A. G. Trudeau.

AMSC Notes Soviet Mathematics Emphasis

An indication of the importance attached to mathematics by Soviet leaders was noted at the recent semiannual meeting of the U.S. Army Mathematics Steering Committee, held at the Human Resources Research Office, George Washington University campus, Washington, D.C.

The Soviet Union, it was reported, has approximately 130 technical centers, each of which is supported by a mathematical organization equivalent to a university mathematics staff.

Approximately six years ago the AMSC recognized that the United States was not training a sufficient number of personnel in applied mathematics to meet expanding military requirements. Based on an AMSC recommendation, the Army Mathematics Research Center was established on the campus of the University of Wisconsin at Madison.

Dr. R. E. Langer, Director of the AMRC, reviewed its recent progress at the Washington meeting. More Army R&D facilities are using the Center's consulting service and two symposia—one on Electronic Waves and the other on Advanced Experimental Designs—attracted experts from within and outside the Army.

The Center has initiated a Fellowship Program in Applied Mathematics and 4 of 36 applicants have been accepted. In conjunction with this program, the University of Wisconsin, which operates the Center, is offering new courses in Applied Mathematics. Army mathematicians Dr. Langer said, are encouraged to participate in this program and other facilities or talents of the Center.

In discussing a Special Research Program in Numerical Analysis being conducted under Army contract at Duke University, Dr. F. J. Murray, director of the program, said efforts to find answers to some problems fail because they have been improperly structured for solution by computers. He emphasized that the structuring portion of a computerized problem has been neglected too often, and that it cannot necessarily be handled by automatic programming.

Among recommendations of the AMSC was that the Army Research Office at Durham, N.C., should consider, as a military theme, "Approximation and Interpolaton of Functions of More Than One Variable."

The AMSC expressed concern with the general problem of statistical information acquired by administrative forms. As an initial step toward improved effectiveness, the committee recommended that the forms used for the Army Research Task Summary be studied with a view to identifying research problems on the validity of data collected.

(For information on other actions at the AMSC semiannual meeting, see the June issue of the *Army R&D Newsmagazine*.)

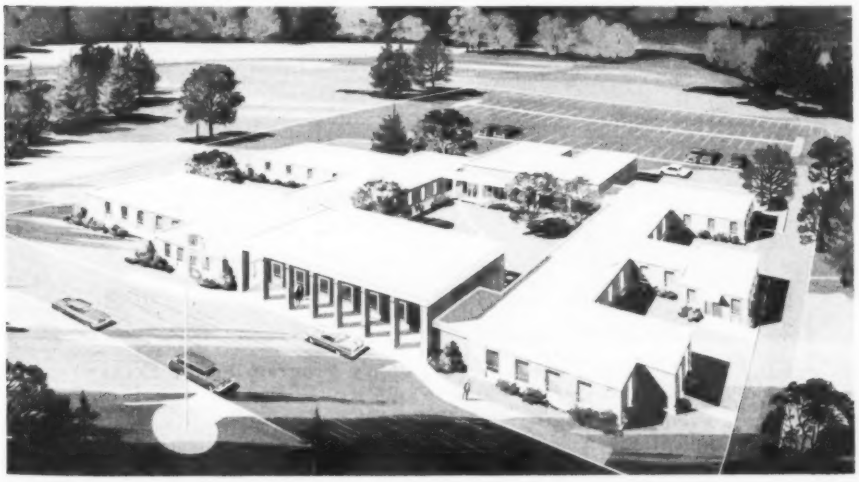
Waterways Station Building New Headquarters

Construction of a $680,000 administration headquarters at the U.S. Army Waterways Experiment Station, Vicksburg, Miss., to replace facilities destroyed by fire last October, is expected to begin in September.

Bids will be taken between mid-July and mid-August.

The 4-unit headquarters will include executive and administrative offices library and research center, electronic computer, instrumentation laboratories, photography laboratories, editing and print shop, drafting room, conference rooms, cafeteria and central heating plant.

Walls will be of concrete block with brick facing and floors will be concrete to make the structure as fireproof as possible. Some of the partitions will be movable and firewalls will be built between the library and other portions of the buildings.



Architect's drawing, new U.S. Waterways Experiment Station Headquarters.

40 Experts Let Fancy Soar On Complex Missile Systems

More than 40 of the Nation's top missile scientists met recently at White Sands Missile Range, N. Mex., to construct the most complex missile systems yet devised.

Systems, however, were only mathematical symbols and their imaginative test flights were conducted through electronic computers.

Scientists meeting at the Fourth Probabilistic Models Symposium aimed at expanding their techniques of simulating missile flights within the laboratory to determine behavior patterns.

Papers were presented by representatives of National Aeronautics and Space Administration, New York University, WSMR, Army Research Office and industrial firms engaged in missile research and development.

Services United in Assault on Radio Frequency Woes

By Maximilian Ware, Chief, General Projects
Communications Branch, R&D Division, Office of the Chief Signal Officer, Department of the Army

Ills and disasters, great and small, are usually preceded by portents. If recognized, and heeded with prompt and proper reactions, anticipated effects may be reduced or forestalled.

The ill we are concerned with here is a serious one—the collapse of our electronic equipment operations because of mutual radio interference and a consequent impedance to accomplishment of the Army mission.

The portent has been recognized. Modern warfare places an increasing dependence of new weapons systems, and command, on electronics. In the typical Army Combat Division, for example, electronic equipment has tripled since World War II, and the demand steadily increases. Corresponding increases in the use of electronics are found in the Navy, in the Air Force, and in the civilian economy.

Each electronic transmitter requires a portion of the electromagnetic spectrum for the transmission of its bits of information. But the spectrum, which must accommodate all, is a fixed resource, and there is a limit to its subdivision. Even with an ultimate perfection in equipment design and operation, the eventual incompatibility of requirements and resources is obvious.

Because equipment design and operation are far from perfection, the problem of incompatibility is with us now, and the management of this most valuable resource demands greater attention as time goes on.

In April 1955 the Chief of Research and Development directed that the Chief Signal Officer investigate the mutual interference problem associated with crowding in the electromagnetic spectrum. Project Monmouth, which carried out the order, indicated enough cases of frequency congestion and serious operational interference to warrant a complete and continuing study of the problem.

The report of Project Monmouth recommended establishment of a full-time technical organization within the Department of Defense to pursue and supervise a unified program; to develop a base for plans and policies for control of electromagnetic usage; to emphasize research and development of new components and circuitry; to improve the state-of-the-art in respect to interference reduction; and to exploit unused portions of the spectrum.

In the Army Signal Corps, reaction to the report was immediate.

Studies of mutual interference among communication type and radar type equipment and of interference reduction circuitry, underway for a number of years, were intensified. Programs were initiated to determine significant characteristics of electronic equipments in their contribution to radio interference; how to measure or evaluate these characteristics; to determine their parameters; to fix limits which could be used in design and production, and how to use collected information on equipments most effectively.

Consideration of the problem by a joint service group led to the issuance of the Radio Frequency Compatibility Program (RFCP) by the Secretary of Defense in June 1960. This formalized objective provided a way to treat problems of mutual interference on a DOD-wide basis, and served as a spur to efforts which the individual departments had been making. Because of the necessity for sharing the common limited resource, a joint program offers the best hope for maximizing its most economical use.

Objectives of the RFCP are divided into Research and Development and Operational areas. R&D includes: Developing joint engineering standards; establishing pertinent technical characteristics and limits for the different types of electronic equipments and systems; adoption of measurement techniques and test procedures to determine the values of critical characteristics; data dissemination handling techniques; development of the necessary test equipment; collection of equipment and systems characteristics for all standard electronic transmitters and receivers; development of tubes, components, and circuitry to enable improvement of those characteristics meaningful in interference reduction and in minimum spectrum usage; and an educational program consisting of manuals for technical and for nontechnical personnel.

Objectives in the Operational (frequency management) Area include as-

Discussing the Radio Frequency Compatibility Program at the Pentagon: left to right, Charles A. Gregory, Chief, Radiation & Propagation Branch, U.S. Army Radio Frequency Engineering Office, OCSigO; Lt Col Lee B. Brownfield, Chief, Communications Avionics Branch, Communications Electronics Division, Office of the Chief of Research and Development; Robert F. Brady, Chief, Communications Branch, Research and Development Division, OCSigO.

Coherent Light Displayed As Communication Medium

Coherent light, made possible by the development of optical masers, was used to send a message which unfurled a flag and cut the ribbon opening the Armed Forces Communications and Electronics Convention held recently in Washington, D.C.

The demonstration, by the American Telephone and Telegraph Co., presaged a new medium of communication capable of carrying more messages than the radio spectrum can handle.

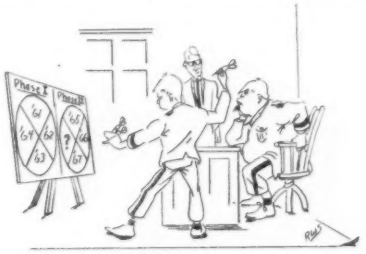
Coherent light, focused and disciplined so it moves in phase as radio waves do, may be utilized in the future because of the saturation use by present communications equipment of the radio spectrum.

Researchers are also investigating the possibility of using the light beam as an optical radar and as a surgical instrument which could destroy selected living cells.

Experiments Design Conference Scheduled Oct. 18-20

The Seventh Conference on the Design of Experiments in Army Research, Development and Testing will be held at the U.S. Army Signal Research and Development Laboratories, Fort Monmouth, N.J., Oct. 18-20.

Held under the auspices of the Army Mathematics Steering Committee, the conference is conducted for the benefit of the scientific personnel in the Army research, development and testing facilities.



"Major MurKle will now present estimates on the completion dates of this project."

Outstanding scientists will discuss recent developments in statistical theory and the design and analysis of experiments. The Technical Session will enable Army scientists to share their successes in carrying out various types of experiments with persons from other installations. Papers on experiments in the predesign phase and on unsolved problems will be presented in the Clinical Session.

Army personnel wishing to present papers should submit proposals prior to Aug. 31 to the Army Research Office-Durham, Box CM, Duke Station, Durham, N.C., ATTN: Dr. F. G. Dressel. Papers presented will be published in conference proceedings.

Paper Explains Radar Echoes From Vicinity of Satellites

Radar observations providing evidence of satellite-related ionization effects are reported in a paper published under a Department of the Army contract by John D. Kraus and Robert C. Higgy of the Ohio State University Radio Observatory.

Prepared for the Army Rocket and Guided Missile Agency, Huntsville, Ala., the paper states that radar echoes in the vicinity of a satellite appear to be caused by fast-moving disturbances (50 km./sec. or more) either moving with the earth's magnetic field, across it, or both.

The authors state that present data is insufficient to determine whether the echoes are caused by traveling condensations of some type of wave or traveling electron or plasma clouds, or more complex configurations such as plasmoids.

Stahr Sees National Attitude Shifted on Armed Readiness

Secretary of the Army Elvis J. Stahr, jr., declared in a recent speech that the present American acceptance of using armed readiness as an instrument of peace is a radical departure from the historic attitude of this Nation.

Noting that from the earliest days of the Republic Americans have viewed military power with extreme suspicion, Secretary Stahr asserted that it was quite probable that World War I, World War II and Korea would not "have occurred had we possessed defense forces . . . sufficiently ready and powerful to impress the aggressors with our immediate military capability."

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sembly of a "Library" of characteristics information or "spectrum signatures" for each model of electronic equipment, and assembly of an "Environment File" by the Military Communications-Electronics Board for the systematic procurement of information regarding the planned specific operational environment of electronic equipments and systems.

The Spectrum Signature File and the Environment File are to be stored at a joint services analysis center where a comprehensive radio frequency compatibility analysis program will be established. The Center will analyze characteristics of equipment under development to determine conformity with established standards; examine spectrum signatures of equipment involved in a given operational environment to determine if problem areas exist; and analyze operational environmental conditions existing in problem areas.

The establishment of the joint service Analysis Center at Annapolis, Md., is being accomplished for the DOD by the Air Force, with initial funds provided by DOD. It will be supported after establishment by contributions from the three Departments.

The Army Chief of Research and Development has placed primary responsibility for the conduct of the Army portion of the RFCP on the Chief Signal Officer. Earlier work of the U.S. Army Signal Research and Development Laboratories (USASRDL) at Fort Monmouth, N.J., facilitated completion of the joint spectrum signature collection plan and the joint environment file plan.

Army, Navy and Air Force Departments are now engaged in the collection of data in accordance with the plans. The U.S. Army Electronic Proving Ground at Fort Huachuca, Ariz., is collecting data on existing equipments, with emphasis on radar types. Other Technical Services of the Army are collaborating by making equipment available for the necessary tests.

This work will be substantially completed in two years—some indication of the magnitude of the task.

Work on additional technical standards for electronic equipment has been initiated at USASRDL, responsible also for the collection of data on items under development until the information may be included as a part of the contractual requirements.

Efforts in all of the R&D areas involved in the RFCP have been augmented by increased funding support.

Potential interference in uses of the radio frequency spectrum increases exponentially. Every additional emitter of energy in the spectrum multiplies the number of possible interference patterns.

Because of new devices for new uses of the spectrum presently under development, an "equipment explosion" is anticipated. The production of quantities of new types of radiating devices and customer demands for rights to use them will result in unprecedented occupancy of the radio frequency spectrum.

Solutions to these difficulties through new techniques and technology must be found in time to permit the orderly introduction of advanced designs into the electromagnetic environment they must endure and their proper accommodation in the radio frequency spectrum.

The Department of Defense RFCP is a means to that end.

Prevention of Deterioration Center Serves All National Defense Agencies

By Dr. C. J. Wessel and Dr. W. M. Bejuki
Director and Assistant Director, Prevention of Deterioration Center

Recital of some of the appalling costs associated with deterioration of materials and equipment can help us to focus quickly on the fundamental values, techniques, and needs in the field of deterioration prevention.

In this field a growing role is being played by the Prevention of Deterioration Center (PDC) of the National Academy of Sciences-National Research Council, Washington, D.C.

The Center serves, in an advisory capacity, all agencies of the U.S. Department of Defense concerned with deterioration problems, and is funded jointly by the Army, Navy and Air Force.

Scientific advice and consultation on deterioration problems are available from the Center through its Advisory Committee, drawn from highly qualified scientists throughout the United States, or from its permanent staff located at the Center.

Information center and question answering services are based on the Center's extensive file of some 50,000 documents pertaining to deterioration and its prevention; and upon the knowledge and experience of the staff. A laboratory fungicide screening program is conducted at the University of Maryland under an Office of Naval Research subcontract.

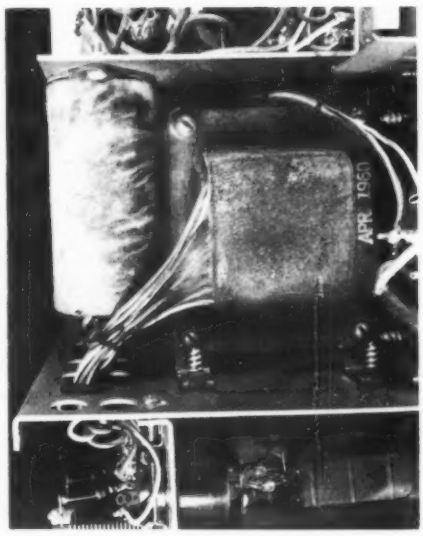
The publications of the PDC, available at no added cost to Department of the Army officers and personnel, include: the monthly *Prevention of Deterioration Abstracts*, the monthly *Environmental Effects on Materials and Equipment Abstracts*, the quarterly *PDC Newsletter, PDC Fungicide Screening Reports*, bibliographies on specialized subjects, and the textbook, *Deterioration of Materials, Causes and Preventive Techniques*, plus a number of special topic publications.

The Services Technical Committee, consisting of an Army, Navy, and Air Force scientist, works closely with the Scientific Advisory Committee of the Center and effectively coordinates possible interservice liaison. Liaison is aimed at assisting these and other Government agencies, industry, and universities to work in closer unison on specialized areas of materials-environment deterioration problems.

Conference host facilities are provided at no cost by the Center to provide a common meeting ground, divested of special interests, for the discussion and solution of important deterioration problems.

Perhaps the PDC's most important function lies in coordinating the efforts of industry and the military services in attacking the problem of deterioration. How great is this problem is indicated by the following statistics:

A few years ago a conservative estimate of losses due to deterioration set the total annual figure at $12 billion.



Heavy fungus growth on electronic tube tester's transformer and capacitor, with bridging by fungal filaments on hookup wires, after 28 days exposure to high-humidity environment.

The cost of corrosion alone is estimated at $6 billion to $8 bil'ion.

Maintenance, of which a significant portion is directly related to deterioration, costs the Army $1.6 billion a year for an inventory of $24.2 billion ("Armed Forces Management," Apr. 1, 1961).

Termite damage costs the United States about $100 million annually.

Corrosion of oil refinery equipment has been estimated to add one cent per gallon to the cost of gasoline.

Loss in buried pipe due to corrosion is placed at from $50 million to $500 million.

United States losses annually due to moth damage of fabrics are estimated from $100 million to $500 million.

The annual loss, including foodstuffs, caused by rats and other rodents is estimated to be between $1 and $2 billion.

More than 2.5 percent of all steel and iron in use corrodes away every year. This amounts to 46 million tons, at one time approximately 40 percent of our national output.

The petroleum industry spent about $273 million in 1956 to protect its equipment, railroads $500 mil'ion, the U.S. Navy $100 million, and farmers $300 million to replace rusting equipment.

A comprehensive evaluation of losses due to the effects of fungi on various industrial products would have to consider the following items. In wood products, annual loss by decay is estimated at $300 million, exclusive of the costs of preservative treatments applied to minimize such damage. In raw cotton an annual loss ranging as high as $75 million can be expected. On finished cellulose-containing items, a fair estimate is $100 million. Deterioration by micro-organisms can be expected to cost the textile industry $75 million annually.

United States Army records show a loss in tent deterioration due to microbiological damage of $4 million per month during World War II.

To organize its work and best serve the needs of the Department of the Army, Navy, and Air Force, the PDC classifies the substance of its work into three categories, (a) materials and equipment, (b) the environments, and (c) protective devices and designs.

The materials and equipment encompassed in the scope of the Center work may be said to include all those utilized by the Armed Forces, exclusive of foods and drugs.

The definition of environments is perhaps somewhat more difficult. As defined by the Center, "environment" is meant to denote forces or manifestations of energy on Earth, in or under the sea, in the atmosphere, or in space—encountered during transportation, storage, or operation—which tend to cause material entities to deteriorate, i.e., undergo a loss in value, or to decrease the ability of a product to fulfill the purpose for which it was intended.

Because of historical reasons, it has become usual to delineate two classifications: (a) the "natural" environment associated with climatic factors and ancillary phenomena, and (b) the "induced," "hyper," "operational," or "space-associated" environments.

In the natural environments, chemical and biological factors predominate. Thus the emphasis is on moderate heat, sunlight, wind, sand, dust, moisture in all forms, oxygen, ozone, salts, acids, alkalis, mildew and rot organisms, bacteria, insects, and marine organisms.

In the realm of the induced environments emphasis is found to be on physical and engineering aspects of mechanical shock, vibration, excessive heat, vacuum, gravity, magnetism, electromagnetic radiation, dissociated and ionized gases, plasma, meteoritic dust, auroras, and coronas.

The effects of the induced environments are as truly deteriorative of materials and equipment properties as are those of the natural factors. In the state of the field today, the choice of words to classify the newly important so-called induced environments is somewhat confusing and inadequate. Many of the newly recognized environmental factors are, for example, quite "natural." For the purposes of the Center the terms natural and induced are being used as a matter of convenience.

In the third category presented, that of protective devices and designs, the Center is interested at all times in gathering information on the latest methods of preventing deterioration of materials and equipment by whatever means may be developed.

Apart from the biological complex to which materials may gradually succumb, more dynamic and dramatic deteriorative effects can be traced to other environmental influences. The ozone content of the air will effect a material such as natural rubber and cause chemical oxidative changes.

In areas of dust storms, the abrasive properties of gritty particles can

dramatically alter finishes, making them pervious to moisture, and the subsequent formation of various oxides of iron, aluminum, magnesium, brass or whatever metal substrate is involved is evidence of surface deterioration.

Solar radiation can contribute portions of the energy spectrum in the ultraviolet range which initiates and accelerates various chemical processes resulting in polymerization or depolymerization and various other phenomena on finished objects or their protective coatings.

Photoactinic degradation can be studied in relationship to textiles, dyestuffs, plastics, natural and synthetic rubber, paints and lacquers, and other materials which may be of interest in themselves or which may be components in finishes of sundry kinds.

In addition to oxygen, ozone, and the various atmospheric contaminants already mentioned, examples of chemical and physical agents of deterioration would involve the effects of acids, alkalis, salts and other chemicals with which materials will come in contact.

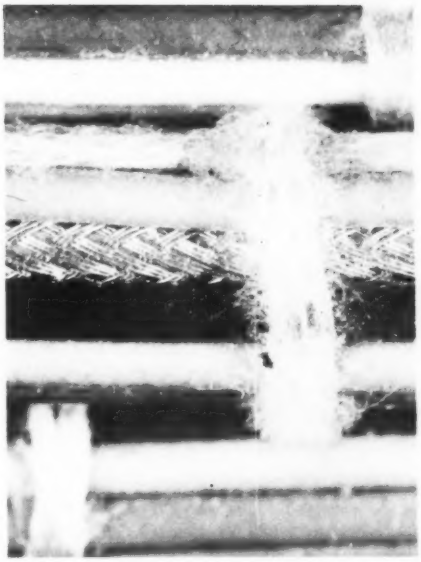
No material is completely immune to the influences of the environment. It is proper to note that materials such as glass, stone and concrete, fuels and lubricants are adversely affected. Fabrication of such basic materials into complicated geometrical useforms makes weathering phenomena control more difficult.

In finished items, too, the interaction of the various materials entering into a component may cause serious problems of deterioration. A grommet or a lubricating seal, for example, may directly introduce a corrosion phenomenon on the parts adjacent to it or, if it is not corrosive itself, an organic substance used as a grommet may absorb water to the extent that it will aid in producing a corrosion phenomenon and may encourage microbial deterioration.

As all branches of the Armed Forces reach out in their explorations into outer space, additional factors, previously of lesser importance and considered on a somewhat more academic basis, also begin to bear on deterioration and its prevention. These environments have associated with them problems of mechanical shock, vibration, excessive heat, vacuum, gravity and near gravity, magnetism, electromagnetic radiation, dissociated and ionized gases, plasma, meteoritic dust, auroras, and coronas.

The deterioration prevention art is supported by numerous talents in industry, the Armed Forces, Federal Government, and in academic circles. The polymer chemist, for example, in many cases is busily engaged with providing us with durable, inert, plastic systems which are applicable to preservation and durability. Meanwhile, the textile chemist is teaching us how to modify fibers, specifically cotton, so that they will not be prone to easy deterioration.

The pesticide chemist continually searches for, and often successfully provides, pest control agents which give us effective fungicides, insecticides, bactericides, termiticides, and chemicals to minimize the effects of marine organism attacks and fouling problems.



Fungus growth on harness lacing and radar fuze test set wire insulation.

The biologist provides us with life histories and information on the physiology and biology of the numerous deteriorative organisms with which man is competing, so that effective chemical and biological control may be instituted.

Physicists and engineers study the basic factors that are deteriorative in shock, vibration, friction, heat, vacuum, and near zero gravity conditions so that an understanding and mitigation of these forces can be realized.

Many scientific societies such as the National Association of Corrosion Engineers, the Electrochemical Society, the Society for Industrial Microbiology, the American Chemical Society, and several others hold annual and semiannual meetings at which deterioration prevention practices and principles are discussed. PDC representatives attend many of these meetings.

The PDC textbook, *Deterioration of Materials, Causes and Preventive Techniques*, represents the first attempt to bring together under one cover a description of all important techniques in deterioration prevention.

The large mass of reference material at the Center has been organized into a useful information system based on several documentation storage and retrieval principles. A definitive search through the PDC files may involve the use of 17 annual indexes, a McBee Punch Card System, a Peek-a-boo Information Retrieval approach, and even the old "Tropical Deterioration Information Bulletin Index."

The use of this accumulated information has resulted in numerous bibliographies, some involving very specific questions and fairly short in size; other have been very comprehensive and broad and have produced as many as 3,600 titles.

A justifiable question which might arise in the mind of one attempting to decide whether or not information on deterioration practices is of value, may be answered with examples.

Pneumatic tires stored unwrapped in the open deteriorated 90 percent in two years. Losses dropped to 30 percent when the tires were wrapped and stored in the dark at temperatures not exceeding 70° F

In an air-conditioned warehouse, manila ropes retained 90 percent of strength over a 30-month test period, whereas at 120° F. and 50 percent relative humidity, only 50 percent of the strength was retained.

Railroads have found that increasing the useful life of wooden ties by only one year can result in a $150 thousand saving for each 1 million ties used. The Illinois Central Railroad saved more than $17 million by installing 2.3 million treated wooden ties with a 30-year life expectancy.

The use of treated wood in the bituminous coal and anthracite mines in 12 years can effect an estimated saving of $236 million.

The U.S. Army Corps of Engineers estimates that savings of $57.9 million over a 15-year period may be accomplished by using pressure-treated lumber in areas where the rate of wood deterioration is high.

Again, in the military field, jute sand bags in 1956 cost from 14 to 16 cents each. Copper naphthenate treatment of jute sand bags costs approximately 1 penny per bag, and in most cases this treatment can extend the life of these bags almost tenfold.

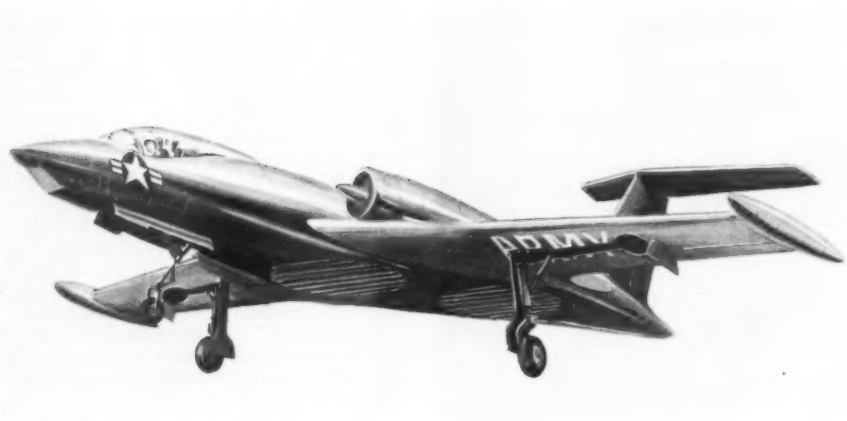
It may be costly to have to rebuild a missile shipped to Europe, which during the shipping has become corroded and has had its organic components, wires, controls, and other items colonized by mildew. More important, however, the life and property-protecting functions of this missile, impaired by any down time whatsoever, represents an inestimably greater cost. Deterioration prevention by means of suitable design, resistant materials, and the use of effective inhibitors is well worth consideration.

Examples of many more such savings in the field of almost all materials are available from the Center, indicating substantial monetary savings. In the military and logistics field, however, the reliability of equipment and gear, with its influence on safety and efficiency, cannot be satisfactorily estimated

Some few research directors, plagued by the difficulty of locating information in today's great mass of literature, have stated that for research projects costing up to $100,000 it is less expensive to repeat the research rather than to attempt to search the literature. Today's effort to establish scientific and technical information centers, in which such knowledge may be readily searched, is aimed at solving this problem.

One of the oldest of these establishments, now in existence for some 16 years, is the Prevention of Deterioration Center, of the National Academy of Sciences-National Research Council. Located at 2101 Constitution Avenue, Washington 25, D. C., and dedicated to the immense task of minimizing all the losses associated with deterioration, it stands ready upon request to provide a good segment of available knowledge on deterioration of materials and its control.

Exhaust-Driven Lift Fans May Give Jets VTOL Ability



Artist's sketch of lift vans mounted in fuselage of jet airplane to give high-speed craft Vertical Takeoff and Landing capability as envisioned in this article.

By Maj Joseph J. Muter
U.S. Army Transportation Corps

Utilization of the exhaust gases from a standard turbojet aircraft engine to drive a pair of lift fans mounted in an airplane's wings or fuselage may produce within the next decade a vehicle capable of vertical takeoff and landing (VTOL) and forward flight at medium to subsonic speeds.

Working under contract with the Army, the General Electric Company has developed a system that incorporates the lift-fan principle. The system has three "building block" components—a conventional jet engine, a diverter valve and a lift fan. The jet engine and the fan are pneumatically coupled by a duct. The diverter valve, located in this duct, controls the flow of exhaust gases from the jet engine to the fan.

For vertical flight, the diverter valve deflects hot gas from the jet engine to a tip turbine which drives the lift fan. During transition from vertical to horizontal flight, exit louvers located on the bottom of the fan divert fan exhaust rearward to provide horizontal thrust for forward acceleration. Once the aircraft has reached speed sufficient for wing-support flight, the gas diverter valve is moved to "straight-through" position, the fan inlet and exit louvers are closed, and the jet operates in normal manner.

Results of tests to date have demonstrated that the G. E. lift fan multiplies the thrust of a standard turbojet by a factor of three. Unfortunately, the weight associated with the lift-fan system, as presently developed. is equivalent to that of three similar turbojet engines. The payoff of the lift-fan combination, however, comes in lower fuel requirements which allows conversion of the usual fuel weight for the two excess engines to payload.

Lift-fan systems designed and tested to date are early in their growth spectrums. Present experience includes the use of a conventional straight jet (J-85) pneumatically coupled to a 76-inch-diameter fan. Future versions would include very lightweight fans, some exceeding 100 inches in diameter, operating with various gas generators. With more advanced lightweight gas generators, now under design, thrust/weight ratios of 15:1 are anticipated with lift-fan systems.

The research program is currently on schedule. Recent wind-tunnel testing in the NASA test facility at Moffett Field, Ames, Calif., provided excellent data. Purpose of the testing was twofold: to test the fan under dynamic conditions and to investigate the inter-related fan effects on the aircraft characteristics.

Next logical phase is evaluation of the entire package in a flying test bed. Tentative plans have been made for the Army to provide funding and management and for the Air Force to provide turbojet engines and previously developed diverter valves.

Considerable interest in the program has been shown by the Air Force, Navy and industry. If the interest shown by other agencies is translated into something more tangible, and further research testing proves the soundness of the approach, an actual development program should produce a useful flying craft by 1970.

Galbraith Succeeds Gergen As ARO-Durham Math Chief

Dr. Alan S. Galbraith became Director of the Mathematics Division, Army Research Office-Durham early in June, succeeding Dr. J. J. Gergen.

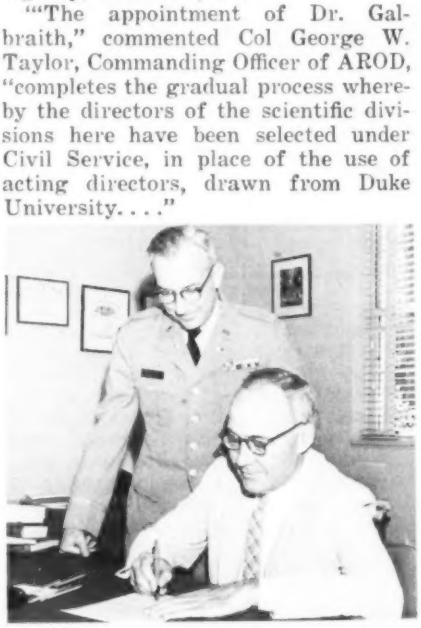
Head of the Department of Mathematics at Duke University, Dr. Gergen will continue to serve AROD as an adviser, and as supervisor of various special projects. He has served as Acting Director of the Division since 1951, when the Office of Ordnance Research, now AROD, was established. In 1959 he received the Outstanding Civilian Service Medal.

A native of Guelph, Ontario, graduated from the University of Alberta, Edmonton, Canada, Dr. Galbraith received his M.A. degree in mathematics in 1930 and his Ph. D. in 1937, both at Harvard University.

After holding various teaching positions at Harvard, Colby College and the University of Rochester, he joined the staff of the Exterior Ballistics Laboratory, Aberdeen Proving Ground, Md., in 1946 and later became Chief of the Theory Branch.

From 1956-58 Galbraith served as Physical Science Administrator, Directorate of Ballistics, Air Force Ammunition Center, Air Force Research and Development Command, Eglin Field, Fla. Until joining AROD he was Associate Chief for Computers and Mathematics, Data Systems Division, Goddard Space Flight Center, National Aeronautics and Space Agency, Greenbelt, Md.

"'The appointment of Dr. Galbraith," commented Col George W. Taylor, Commanding Officer of AROD, "completes the gradual process whereby the directors of the scientific divisions here have been selected under Civil Service, in place of the use of acting directors, drawn from Duke University. . . ."



Dr. Alan S. Galbraith, new Director, Mathematics Division, Army Research Office-Durman, signs oath of office as Col G. W. Taylor, CO, AROD, watches.

By Dr. Ralph G. H. Siu

We frequently face the problem of how to frame a presentation to the "Chief." We wish to approach the matter from *his* point of view. This is no mean task, as we all know.

You may be interested in an excerpt from a dissertation on the matter by HAN FEI TZU (second century B.C.), as translated by Arthur Waley:

"The difficulty of addressing a ruler consists in the difficulty of understanding his state of mind and knowing how to adapt one's arguments to it.

"Suppose, for example, the monarch you are addressing is bent on maintaining a high reputation and you appeal to him only on grounds of material gain, he will regard you as a person of low principles. . . . If, on the other hand, he is bent on material gain and you appeal to him on grounds of reputation, he will regard you as lacking in common sense and out of contact with realities. . . . Again, if he is secretly bent on material gain but professes outwardly to care only for maintaining a high reputation, should you appeal on him on grounds of reputation, he will pretend to be pleased with you, but in reality will keep you at a distance; should you appeal to him on grounds of material gain, he will secretly follow your advice, but will outwardly disown you. . . .

"If you talk to him favorably about his higher ministers, he will think you intend a reproach to himself; if you talk favorably about persons of less importance, he will think you are selling your influence. If you speak of those he is fond of, he will think you are making free with his property; if you speak of those he dislikes, he will think you are doing it to see what he will say. If you speak shortly and to the point, he will think you are too stupid to say more; if you flood him with a stream of learning and eloquence, he will think you importunate and pedantic. If you give only a cursory expression to your ideas, he will say you are too timid to come to the point; if you go into everything, fully and frankly, he will say you are ill-bred and presumptuous.

"Such are the difficulties of addressing a ruler, and it is indispensable that they should be properly understood."

ERDL Present Annual Performance Awards

A young scientist engaged in solid state physics research and a supervisor in charge of a mine warfare and barrier test area are the winners of the annual U.S. Army Engineer Research and Development Laboratories' Medals for Technical Achievement and Leadership.

Dr. Robert P. Madden, presented the Director's Technical Achievement Medal by Lt Gen Walter K. Wilson, Jr., Chief of Engineers, was cited for his achievement in designing and constructing the first successful vacuum apparatus for determination of the true optical constants of metals and semiconductors in the extreme ultraviolet range.

Samuel W. Simmons received the Leadership Medal for his supervision, management, and maintenance of an excellent safety record of the mine warfare and barrier test area at the Engineer Proving Ground. He also was nominated for this award a year ago.

Eight other employees received honors as contenders for the two awards. Certificates as Technical Achievement nominees went to Michael Grant who developed improved filter-separators for decontamination of aircraft and vehicular fuels; Raul Rodriguez who developed an adequate water supply system for Camp Century in Greenland; Mrs. Jean Berning, for mathematical analysis and digital computer program planning in solving problems in thin film calculations and problems in mine detection and topographic computations, and James K. Knaell, for development of a 20-ton rough terrain crane.

The selection of Dr. Madden, 32, for the Technical Achievement Medal marked the third time in four years that the award has been won by a representative from the Physics Research Laboratory of the Electrical Department. The award was first won by Dr. Georg Hass and then by Dr. Rudolf Thun, the former being the chief of the Physics Research Laboratory. Last year, the award went to Harry Smith, a representative from the Military Department.

Dr. R. P. Madden, Chief of Engineers, Lt Gen W. K. Wilson, Jr., S. W. Simmons and Col J. H. Kerkering, USAERDL Commander, at presentation.

33-Year-Old Scientist Heads WSMR Work on ZEUS

One of the country's key missile jobs is in the hands of a 33-year-old scientist at White Sands Missile Range, N. Mex. He is Leon F. Goode, Jr., manager of the NIKE ZEUS anti-missile-missile system with Surface-to-Air Projects Office, Ordnance Mission.

Responsible for reviewing system development testing, monitoring contractor's flight tests and coordinating contractors' support at WSMR, Goode also devises and directs independent research and development evaluation and engineering tests, including those conducted at off-range sites such as Ascension and Kwajalein Islands and Point Mugu, Calif.

The young scientist came to the missile range in May 1956 from Oak Ridge, Tenn. There he was associate development engineer with Oak Ridge National Laboratory and participated in the pilot-plant testing of the first two nuclear homogeneous reactors. Prior to his assignment with the Zeus project, in June 1957, he was section chief with Environmental and General Branch of Electro-Mechanical Laboratories at WSMR.

A native of Tennessee, Mr. Goode was graduated with a B.S. degree in mechanical engineering from the University of Tennessee in 1952 and did graduate work there until he accepted the Oak Ridge assignment.

Anatomical Coding Seen as Weapons Design Tool

Anatomical coding of the body into minute cross sections, suitable for programming research information into an electronic computer, is being directed toward scientific determination of the wounding and killing probabilities of various warheads and fragments.

Army Ordnance Ballistic Research Laboratories, Army Chemical Center and The Surgeon General's Office personnel are cooperating in investigations conducted under Joseph Sperrazza, Chief of the Special Problems Branch, Terminal Ballistic Laboratory at Aberdeen Proving Ground, Md. Special Project Officer on the task is Lt Richard Kneibert of APG.

Researchers are seeking to discover techniques of rapid and accurate evaluation of how efficient and economical weapons systems are in destruction of enemy targets—without resort to extensive test firings.

For programming appropriate information to the computer, the 107 anatomical cross sections contained in Eycleshmyer's and Shoemaker's text on anatomy have been modified by superimposing a grid system which generates rectangular parallelepipeds .5 cm./square with a thickness of 2.6 cm.

The system will result in more than one million squares, each coded as to location within the cross section, the tissue type, the retardation factor for the fragment under study, and a scale of incapacitation.

Efficiency of fragment dispersion and penetration of projectiles designed for employment against hard targets can be determined easily. But in the case of projectiles for use against human targets, the determination is presently limited, understandably, by the lack of volunteers! Hence the attempt to compute this damage.

Initial phases of the project will be limited to programming the Laboratories' EDVAC Electronic Computer to determine the degree of incapacitation resulting from fragments or bullets entering the human body at horizontal angles. Later research will include fragments entering at any and all angles.

A major problem to be overcome is the coding of various organs, muscles and the circulating system so as to reproduce exactly within the computer the relative position of these organs in the human anatomy.

Development of computer programming techniques to simulate targets as well as the geometry, weight and velocity of a fragment or projectile will ultimately permit, it is hoped, reliable electronically rapid evaluation of the destructive power of any proposed projectile or fragment.

Letters Show No Fetters In Requesting CmlC Aid

"Please send me some samples of nerve gas."

Like the Army's missile men at Redstone Arsenal, Ala. (See *Army R&D Newsmagazine*, May, p. 22) scientists at the Chemical Corps Research and Development Laboratories, Md., receive some strange requests from the Nation's curious, searching, younger generation.

One high school student asked for the chemical composition of "nerve gases" for a "chemistry" project. Another wrote:

"In several recent magazines I have read about a certain type of gas which causes one to lose all powers of resistance, yet he remains conscious of his surroundings. If this is not top-secret information, would it be possible for you to send me the formula for making it?"

Information about an "odor meter" to measure the strength of smell was requested by several students who had seen the device used in popular TV commercial.

A sports parachute club wanted to know how its plummeting members can leave noncorrosive smoke trails in the air without dissolving their chutes.

A more serious student inquired: "How can I obtain a continuous white smoke, unattended and used to simulate boiling in a very large kettle placed outdoors, as part of a science demonstration to last several hours?"

"Any information you have concerning the method of artificially making snow" was the objective of one letter.

Among many unspecific requests was one which stated: "I am a student at ..... School. I would be very grateful if you would send me information concerning chemical warfare."

Most of the letters seeking information are from authoritative, well-informed persons in the Armed Forces, industry, colleges and universities, federal and state agencies, and the medical profession. To the Technical Information Division falls the task of answering each, the "unusual" as well as scientific-military letters.

12 APG Essayists Get Prizes for Ordnance "Goals"

"From Breed's Hill to Pork Chop Hill—thousands of miles and well over a century apart—the true definition of (U.S. Army) Ordnance has been the battle-proven superiority of its product."

CWO Marion Oldaker of the Ordnance School, winner of the first prize in the 1961 Aberdeen Proving Ground Essay Contest, drew this conclusion and said Ordnance must have the "continued resolve and achievement of people working in a field where non-improvement of Today's best means failure and obsolescence Tomorrow."

Recipient of the first place case award in the civilian division was E. S. Schroder, Jr., of the Ordnance Training Command, who pointed out that "Ordnance is proud of all the things it is, but it is most proud of being the first friend to the fighting man."

Cash awards to the six military and six civilian winners of the contest were made recently by Brig Gen John H. Weber, Commanding General, Aberdeen Proving Ground, Md.

Other winners in the military division were: Capt Carlton P. Weidenthal, Army Ordnance School and Sp/7 Glenn W. Hendricks, Co. B, Special Troops, second place; Capt Jack Siewert, Ordnance Training Command, Maj Patrick P. Reams, Post Adjutant, and Maj Stanley E. Thevenet, Army Ordnance School, third place.

Other civilian winners: Bernard Ames, Army Ordnance School, and Mrs. Zenna Nelson, Ordnance Training Command, second place; and Walter E. Gross, Jr., Ballistics Research Laboratories, Daniel Tamkus, Development and Proof Services, and John B. Reizen, Development and Proof Service, Yuma Test Station, Ariz., third place.

CmlC Craftsman Ends 42 Years of Edgewood Arsenal Service

After serving the Army as a civilian employee for more than 40 years, James J. Miller, skilled craftsman in the experimental fabrication branch of the U.S. Army Chemical Research and Development Laboratories, Army Chemical Center, Md., recently put away his tools in favor of the life of leisure.

Mr. Miller became a civilian employee at the Chemical Corps Edgewood Arsenal, now the Army Chemical Center, on Apr. 25, 1919, the day after he completed his tour of duty as a World War I private at the Arsenal.

Until his retirement he worked in close support of the laboratories' engineers and other professional people in building a great variety of experimental devices and equipment.

Calendar of Scientific Activities

2nd International Congress of Radiation Research, Harrogate, England, Aug. 5-11.

18th International Congress of Pure and Applied Chemistry, sponsored by International Union of Pure and Applied Chemistry, Montreal, Canada, Aug. 6-12.

Symposium on Atmospheric Ozone and General Circulation sponsored by International Ozone Commission and World Meteorological Organization, Arosa, Switzerland, Aug. 6-12.

Guidance and Control Conference, sponsored by American Rocket Society and Stanford University, at Stanford University, Calif., Aug. 7-9.

6th Annual Technical Symposium of the Society of Photography Instrumentation Engineers, Redondo Beach, Calif., Aug. 7-11.

International Symposium on Microchemical Techniques, sponsored by Union of Pure and Applied Chemistry, University Park, Pa., Aug. 13-18.

14th Congress of the International Association of Applied Psychology, Copenhagen, Denmark, Aug. 13-19.

16th Calorimetry Conference, Ottawa, Canada, Aug. 14-17.

4th General Assembly of the International Mathematical Union and the 12th International Congress of Mathematicians, Stockholm, Sweden, Aug. 15-22.

11th General Assembly of the International Astronomical Union, Pasadena, Calif., Aug. 15-24.

2nd International Electronic Circuit Packaging Symposium, University of Colorado, Boulder, Colo., Aug. 16-18.

8th International Congress for Microbiology, Montreal, Canada, Aug. 19-25.

Colloquium on Experimental Research and Shell Structures, Delft, the Netherlands, Aug. 20-Sept. 2.

Symposium on Science Information sponsored by the 10th Pacific Science Congress, Honolulu, Hawaii, Aug. 21-Sept. 6.

International Hypersonics Conference, sponsored by American Rocket Society, Massachusetts Institute of Technology, Cambridge, Mass., Aug. 21-23.

International Conference on Photoconductivity, sponsored by the International Union of Pure and Applied Physics, Ithaca, N.Y., Aug. 21-24.

4th Biennial Gas Dynamics Symposium sponsored by the American Rocket Society and the Northwestern University Technical Institute, Evanston, Ill., Aug. 23-25.

Conference on Radioisotopes in the Biological Sciences, sponsored by International Atomic Energy Agency, Vienna, Austria, Aug. 23-Sept. 1.

16th Symposium of the International Astronomical Union, Sacramento Peak, N. Mex., Aug. 24-26.

10th International Congress on Radiology, Montreal, Canada, Aug. 26-Sept. 1.

Annual Meeting, American Institute of Biological Sciences, Lafayette, Ind., Aug. 27-Sept. 1.

6th International Conference on Coordination Chemistry, sponsored by American Chemical Society and AFSC, Wayne State University, Detroit, Mich., Aug. 27-Sept. 1.

Symposium on Chemical Physics on Non-Metallic Crystals, sponsored by Atomic Energy Commission, National Science Foundation, Northwestern University and AFSC, Evanston, Ill., Aug. 28-Sept. 1.

5th International Conference on Ionization Phenomena in Gases, sponsored by the International Union of Pure and Applied Physics, Munich, Germany, Aug. 28-Sept. 1.

Conference on Meteorphysics sponsored by Air Force Cambridge Research Laboratories, Smithsonian Astrophysical Laboratory, Cambridge, Mass., Aug. 31-Sept. 2.

3rd International Conference on Analog and Antilog Computation, sponsored by International Association for Analog Computation, Belgrade, Yugoslavia, Sept. 4-9.

International Conference on Low Energy Nuclear Physics sponsored by International Union of Pure and Applied Physics, Manchester, England, Sept. 4-9.

8th Anglo-American Aeronautical Conference, sponsored by Royal Aeronautical Society, Canadian Aero Society and Institute of Aerospace Sciences, London, England, Sept. 4-14.

International Conference on Magnetism and Crystallography, held in conjunction with the International Symposium on Electron and Neutron Diffraction, Kyoto, Japan, Sept. 4-15.

International Conference on Machine Translation of Languages and Applied Language Analysis, Teddington, England, Sept. 5-8.

National Symposium on Space Electronics and Telemetry, Albuquerque, N. Mex., Sept. 6-8.

Joint Nuclear Instrumentation Symposium, sponsored by American Institute of Electronic Engineers, Instrument Society of America, and Institute of Radio Electronics, North Caroline State College, Raleigh, N.C., Sept. 6-8.

3rd International Congress on Cybernetics, sponsored by International Association for Cybernetics, Namur, Belgium, Sept. 11-15.

7th International Conference on Cosmic Rays, Kyoto, Japan, Sept. 11-15.

Department of Defense Symposium on Electronic Warfare, sponsored by U.S. Navy, Stanford Electronics Laboratory, Stanford University, Palo Alto, Calif., Sept. 13-15.

Industrial Electronics Symposium, sponsored by American Institute of Electronics Engineers, Boston, Mass., Sept. 13-15.

Maj Gen August Schomburg, Commanding General, Army Ordnance Missile Command, Redstone Arsenal, Ala., demonstrates a Redeye, shoulder-fired antiaircraft missile, to Lt Gen John Calvin Munn, Deputy Commandant of the U.S. Marine Corps, which is funding part of cost of developing the Redeye.

TAG-Developed Tester Gauges Night Vision Ability

Research scientists of the Human Factors Research Branch, Office of The Adjutant General Research & Development Command, have designed a device—the Army Night Seeing Tester (ANST)—to identify men who have the basic capacity to see well at night.

Of two tanks equidistant from an observer post, the one situated against a noncontrasting background is naturally harder to detect, particularly at night. Even so, a man who possesses good "brightness contrast sensitivity" may spot the well-camouflaged object, whereas a man lacking this ability may not.

Although many practical problems of night seeing can be resolved through night seeing training or through use of light intensifier devices, men with a high basic level of night seeing ability are still needed for key positions in many critical night operations.

Designed for use under field conditions, the ANST simulates a 20-foot viewing distance and one-quarter moonlight illumination. A tritium-activated light source provides the exact and unvarying illumination needed. Physically, the present model, which culminates a long line of human factors research and development activity, is 4½ inches high, 5 inches wide, and 11 inches deep. Total weight is less than 10 pounds, giving it ready field portability.

In the research accompanying development of the ANST, individual variation in night seeing effectiveness was found to be associated almost entirely with two basic visual functions —brightness contrast sensitivity and line resolution discrimination ability. Visual text content for the ANST hence was developed to measure these two factors.

As with most selection devices, the case for validity of the ANST is based upon proof that its scores can be used as a convenient, economical, and accurate indication of "real-life" performance. A series of simulated field trials to determine the correspondence of ANST scores with the "real-life" performance of several groups of examinees furnishes that proof. These research studies establish the fact that high scorers on ANST are clearly superior to low scorers on night detection courses for infantry night reconnaissance patrols as well as on armored night reconnaissance patrol courses.

Although the ANST taps a vital qualification of various field personnel —the natural ability to see in the dark —use in reception station processing is not proposed. The ANST has its chief ultimate value as an aid to spot assignment by local commanders at Battle Group level to increase likelihood of success in special night operations.

2 Boy Scouts Take Camp Century Summer Jobs

The two Eagle Scouts who spent six months under the ice at Camp Century, Greeland, last year are back there this summer to work.

Eagle Scouts Kent L. Georing of Neodesha, Kans., and Soren Gregersen of Korsor, Denmark, reported for duty recently with the Corps of Engineers Cold Region Research Engineering Laboratories' contingent at Camp Century.

They were hired under a University of Denver contract as scientific assistants, and will stay at Camp Century until early September.

The pair were picked through national competitions in their respective countries to spend last winter at Camp Century. Their presence at the "camp under the ice" was intended to symbolize the peaceful aspirations pertaining to that area, and followed a tradition started by Dr. Paul A. Siple, Scientific Advisor to the Army Research Office. He was an Eagle Scout who accompanied Adm Richard E. Byrd to the Antarctic in 1928.

Scout Goering, 17, will attend the University of Kansas this fall where he expects to specialize in the areas of mathematics and chemistry. Scout Gregersen, 17, plans to study nuclear physics in Denmark after serving two years in the Danish Army.

Balloon Records 74° Below 9 Miles Above Alabama Post

At Huntsville, Alabamans enjoyed May 31 as a typically warm summer day but 74° below zero was recorded at nearby Redstone Arsenal—or, more properly, above Redstone.

A small weather balloon released at 6 a.m. recorded that temperature at an altitude of 46,000 feet while on the way to setting a new local altitude record of 124,000 feet.

Things had warmed up considerably by the time the balloon bearing its package of instruments reached the new record height. The temperature at that altitude was only 31° below zero.

The Army launches the balloons daily to gather weather data essential for missile and rocket testing.

Camp Tuto Program Lists Over 30 Research Tasks

More than 30 research projects are programmed for the summer at Camp Tuto, Northern Greenland operational headquarters of the U.S. Army Polar Research and Development Center.

Technical supervision for projects is being provided by the Army Technical Services. Corps of Engineers personnel have been assigned from the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL), Waterways Experiment Station (WES), and the Research and Development Laboratories at Fort Belvoir, Va.

Col Gerald W. Homann, Commander of the Center since December 1960, holds B.S. and M.S. degrees from the University of Illinois and Harvard University. He is a graduate of the Engineer Officers' Advanced Course, the Command and General Staff College, and the Army War College.

Camp Century NCOIC Reups In Nuclear Plant Vaporizer

One of the most unusual places where an Army man has reenlisted is the vapor container of the nuclear power plant at Camp Century, Greenland, where M/Sgt John H. Buteau of the U.S. Army Polar Research and Development Center recently signed up for six years.

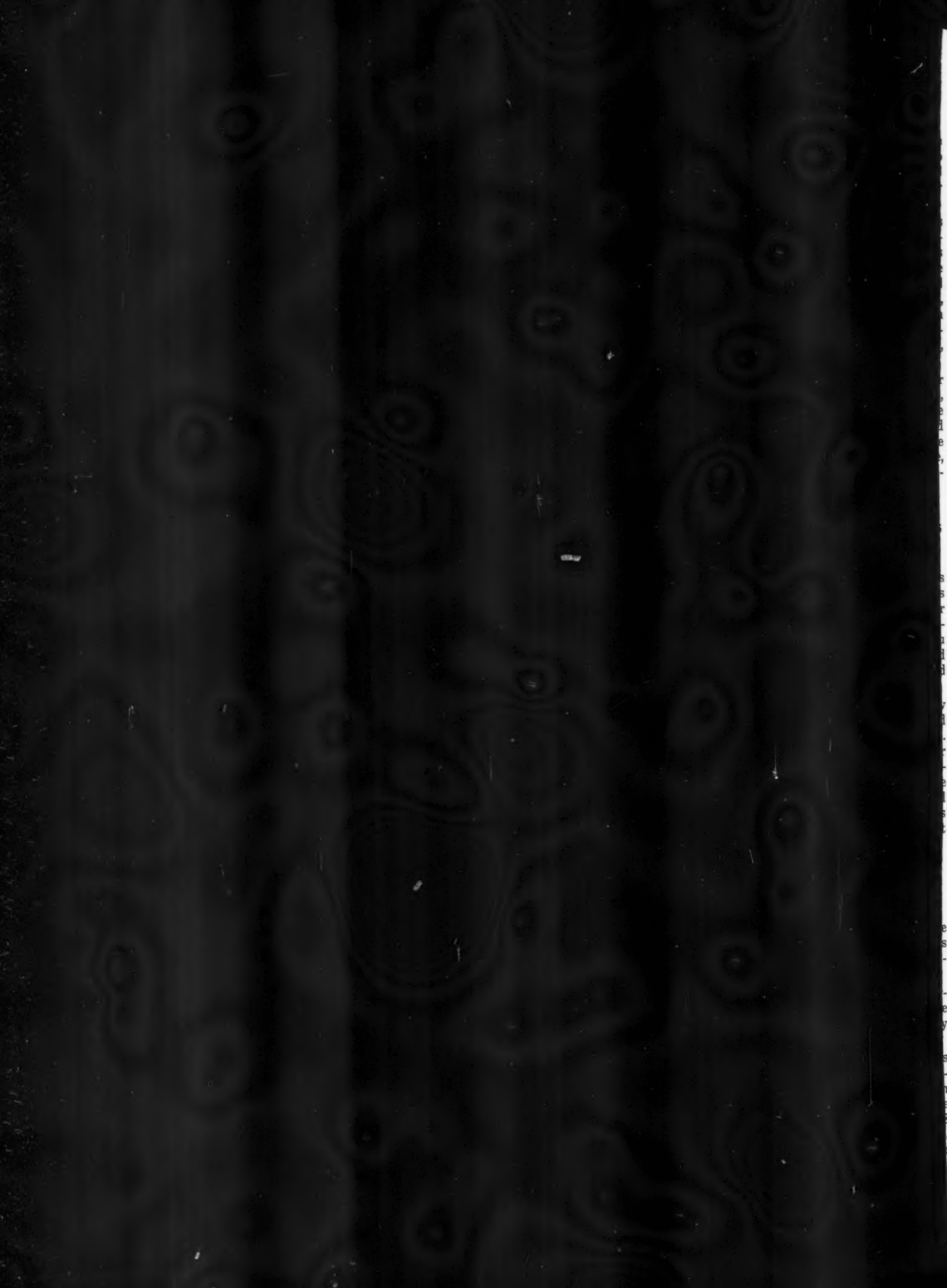
Camp Century, which is under snow and 138 miles out on the Greenland Icecap, is a USA PR&DC installation. Its power is supplied by a nuclear power plant and Sgt Buteau is NCOIC of the Nuclear Power Section. He has been in the Army 12 years and is a native of Hudson, Mass. He was in the Nuclear Reactor Group at Fort Belvoir before coming to PR&DC.

Army Assigns 2 Hawk Battalions To Europe Following Activation

The Army activated two more Hawk surface-to-air missile battalions this spring, bringing the total number of Hawk battalions to 13.

The 8th Missile Battalion, 15th Artillery was activated in April and the 6th Missile Battalion, 62nd Artillery in May at Fort Bliss, Tex.

Assigned recently from Fort Bliss to Europe are the 6th Missile Battalion, 52nd Artillery, and the 6th Missile Battalion, 59th Artillery. The strength of each unit is 38 officers, 8 warrant officers, and 469 enlisted men. Each battalion has four batteries with six launchers each.



(Left to right) Brig Gen John H. Weber, Commanding General of Aberdeen Proving Ground, Md., Dr. Charles F. Pickett, Dr. Myer Rosenfeld, and Col G. F. Powell, Deputy Commander. Special Invention Awards were made to Drs. Pickett and Rosenfeld of the Installations' Coating and Chemical Laboratory.

Civilian Employee Gets Prize for Research as Enlisted Man

William E. Hickman is the recipient of a cash award and a certificate for the best scientific paper written by an enlisted scientist at the Army Chemical Center, Md., in 1960. His award-winning paper described research on the restoration of cholinesterase activity in man.

Dr. Carl M. Herget, president of the Army Chemical Center branch of the Scientific Research Society of America, which sponsors the contest each year, presented the award. Dr. Herget is Director of Research of the U.S. Army Chemical Research and Development Laboratories, where Hickman has been employed as a civilian since December 1960 when he was separated from the Army.

ERDL Electrical Chief Wins Ninth "Outstanding" Award

Oscar P. Cleaver, who has received more work performance awards than any other employee at the U.S. Army Engineer Research and Development Laboratories, Fort Belvoir, Va., recently received his ninth "Outstanding" rating for his work as chief of the Electrical Department.

Cleaver has been with the Laboratories in a military and civilian capacity since August 1942, and also has received several "Sustained Superior Performance" awards.

Another employee, Mrs. Hilda M. Helmcamp, received her fourth "Outstanding" rating as secretary in the same department. A Government employee since March 1948, she also has been the recipient of four "Sustained Superior Performance" awards.

J. W. P. Beaver and Stockton L. Smith received "Sustained Superior Performance" awards and $200 and $150 in cash respectively.

Lt Gen Wilson Takes Over As New Chief of Engineers

Lt Gen W. K. Wilson, Jr., has succeeded Lt Gen E. C. Itschner as Chief of the U. S. Army Corps of Engineers. Promotion to lieutenant general came with the appointment.

General Wilson, 54, has been serving as Commanding General of the Engineer Center at Fort Belvoir, Va., since September 1960. Prior to that he was for almost four years Deputy Chief of Engineers for Construction, Chairman of the Army's Board of Engineers for Rivers and Harbors, and President of the Army's Beach Erosion Board.

Other assignments filled by General Wilson since the end of World War II include Assistant Chief of Engineers for Military Construction; Division Engineer, Mediterranean Division; Division Engineer, South Atlantic Division; District Engineer, Mobile, Ala.; District Engineer, St. Paul, Minn.; and Commanding General, 18th Engineer Brigade and Deputy Post Commander, Fort Leonard Wood, Mo.

QM Review Compares Status Of U.S., Soviet Fiber Work

The Soviet Union is far behind the United States in fiber technology, fiber production and the number of different fibers available. But under the prodding of high-ranking officials such as Professor Nesmeyanov, president of the Russian Academy of Sciences, and even Premier Khrushchev the Soviets have produced several synthetic fibers which have no counterparts in the Western world.

This information is provided by the Quartermaster Research and Engineering Command, Natick, Mass., in a review of U.S.S.R. research in synthetic fibers.

Enant is a Soviet polyamide similar to nylon which contains an extra methylene group when compared with Caprolan nylon. Enant has a modest melting point, 225° C. After exposure to temperatures below the melting point, Enant retains physical properties that are superior to those of the common nylons produced in the U.S.

Ftorlon is a fluorine-containing fiber similar to Teflon. Ftorlon is stronger and easier to produce in fiber form than Teflon, which has a much higher melting point.

Vinitron is made by combining two fiber-forming polymers, nitro-cellulose and chlorinated polyvinyl chloride. The resulting product has properties superior to those of either of the original components. In this case, the principle of combining polymers may be more important than the specific product which results.

Pelagon is a polyamide with eight methylene groups in the repeating chain. The Soviets claim that this fiber has exceptionally high resistance to multiple deformation.

Other fibers with Russian names such as Nitron, Lavsan, Anid, Oxsan, and Khlorin are merely attempts to duplicate the acrylic, polyester, and polyamide fibers which find widespread use in the American economy.

Actually, the QM review pointed out, the greatest "threat" from Soviet textile research lies in a possible breakthrough in their extensive work with new and unusual polymers such as the organometallics. Highly heat-resistant fibers with military applications could result if the problems of spinning and low flexibility are solved.

The complete review, "Russian and Satellite Research and Development in the Field of Synthetic Fibers," by R. C. Laible and L. I. Weiner of the Quartermaster Research and Engineering Command, was published in the *Textile Research Journal.* Reprints are available from the authors at the Quartermaster R&E Command.

Tripartite Group Studies Surface-to-Air Missiles

Low altitude surface-to-air missile systems for the field Army received intensive, week-long study at a recent meeting of representatives of the United States, United Kingdom and Canada.

The Tripartite Standing Working group met at the Army Rocket and Guided Missile Agency, Huntsville, Ala., under the chairmanship of Col James K. Taylor of the Office of the Chief of Research and Development.

John D. Clare, Director Guided Weapons Air, Ministry of Aviation, was chairman of the United Kingdom delegation and Maj Dan Janigan, Canadian Directorate of Artillery, was chairman of the Canadian delegation.

Maj Gen August Schomburg, Commanding General of AOMC, and his deputy, Maj Gen John A. Barclay, greeted the group on their arrival. Brig Gen John G. Zierdt, ARGMA Commander, hosted the group.

Dr. W. B. Littler, Director General of Scientific Research (Munitions) for the British War Office (second from right), accompanied by Philip E. Freeman, British Defense Research Board (right) visited Redstone Arsenal, Ala., to discuss missiles and propellants developments. Also shown are Maj Gen August Schomburg, CG, Army Ordnance Mission Command (center), Col Paul B. Schuppener, Deputy Chief of Staff for R&D, AOMC, and Dr. David C. Sayles, Acting Deputy Chief, Research Plans Division, AOMC.

AOA Discusses Advancements In Bomb, Warhead Lethality

New developments in bombs and warheads were discussed during a recent technical meeting of the Bomb and Warhead Assembly Section of the American Ordnance Association at Picatinny Arsenal, Dover, N.J.

Major topics of discussion included the improving lethality of bombs and warheads, the application of fragmenting warheads to space combat, nonexplosive warheads, and the development of cluster type warheads.

Demonstrations of new equipment and a tour of Picatinny's research and engineering facilities were included in the program.

Transparent plastic model of missile is examined at Picatinny Arsenal, Dover, N.J., by (left to right) Maj Gen E. P. Mechling, USAF (retired), American Ordnance Association staff director for technical operations; Col H. H. Marsh, AOA vice president in charge of technical operations; Col S. R. Stribling, USA (retired), World War II bomb expert; James H. Robinson, senior Picatinny Arsenal AOA consultant and supervisor in the Ammunition Group; Col M. H. Davis, chairman of the AOA's Bomb and Warhead Assembly Section; and Maj Gen W. K. Ghormley, Commanding General, Ordnance Special Weapons-Ammunition Command, headquartered at Picatinny Arsenal.

"Broken Bridge" Stars Murphy In Showing Army Missile Role

The role of Army missiles in defense of the Free World is depicted in "The Broken Bridge," an Army R&D film built around Audie Murphy, the most decorated soldier of World War II, and his 10- and 6-year-old sons.

Featured also are Lt Gen Arthur G. Trudeau, Chief of Research and Development, and Brig Gen David C. Lewis, Director of Special Weapons, OCRD. General Trudeau escorts Audie Murphy on a tour of the White Sands (N. Mex.) Missile Range to view the new generation of U.S. missiles.

Available on application submitted to any of the Signal Corps central film exchanges in each of the Army's major commands, the film shows the Army's missiles in Norway, Germany, Italy, Turkey and the Far East.

Maj Gen Myers Assigned CG Of Fort Knox Armor Center

Maj Gen Samuel L. Myers, assigned as Deputy Chief of Staff for Logistics effective May 1, 1961, has been reassigned as Commanding General of the Armor Center at Fort Knox, Ky., effective Aug. 1.

General Myers has served with the Office of the Deputy Chief of Staff for Logistics since December 1958. Until May 1 this year he was Assistant Deputy Chief of Staff for Logistics (Programs and Budget), to which office Maj Gen L. J. Lincoln has succeeded.

3 Versions of Mohawk Plane Seek Better Reconnaissance

The Grumman Aircraft Corp. has under construction a twin-engine airplane capable of flying 80 m.p.h. and a 104-foot-long ship designed to go through the ocean at the same speed.

The plane is the Army's AO-1 Mohawk, designed to carry a variety of observation equipment at both high and low speeds to enable commanders to know what an enemy is doing, in good or bad weather.

Grumman is building three versions of the plane for the Army, each with equipment new or front line use.